MINISTRY OF ENVIRONMENT & FORESTS

CHANGING FRONTIERS OF RESEARCH PROGRAMS IN ICFRE BASED ON XIII RESEARCH POLICY COMMITTEE (RPC) 2012 MEETING

Indian Council of Forestry Research & Education

(An Organisation of Ministry of Environment & Forests, Govt. of India)

P. O. New Forest, Dehra Dun - 248 006

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Foreword

Dr V.K. Bahuguna
Director General ICFRE
Chancellor, FRI Deemed University

I have great pleasure in presenting the "**Changing Frontiers of Research Programs in ICFRE based on XIII Research Policy Committee (RPC) 2012 Meeting"** highlighting new initiatives taken recently in the research planning and prioritisation system**.** Research Policy Committee is the apex body in the Indian Council of Forestry Research and Education (ICFRE) system that prioritize the ICFRE funded research projects of eight research institutes and four research centres of ICFRE, located in different geographical area of the country.

To improve the outcome of the research system in ICFRE, this year the focus of research projects have been recast to meet the aspiration of the society. Four Research Thrust areas with thirty five themes have been identified for ICFRE Research System. Two Thrust Areas one for education and one for extension encompassing four themes each have also been evolved. One National Project Director (NPD) for each Thrust Area has been designated, apart from Chief Project Coordinator and 35 National Subject Matter Coordinators (NSMCs) to give necessary thrust to the changed priorities and to revamp the research information system.

For facilitating the same following initiatives have been taken up recently:

1. The research programmes are now to be necessarily interdisciplinary in nature to ensure that the output of one scientist becomes input of other. As the present fund availability with ICFRE is not very sound, research priorities have been chalked out keeping in view the most urgent needs of the country.

2. Apart from interdisciplinary nature of research, special attention is being focused on networking with institutes outside ICFRE system.

3. One of the major shifts in research planning and prioritisation is to seek linkages with Panchayti Raj Institutions in the country. This will result in people centric forestry based livelihood generating models in the 170,000 forest fringe villages of the country. This will also help in evolving research projects for the beneficiaries.

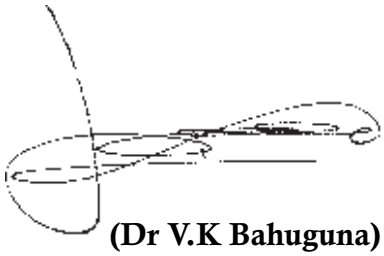
4. Forest Right Act (FRA) 2006 has been introduced granting legal recognition to the right of forest dwelling communities. The research programs would address the issue of evolving suitable sustainable land based forestry models for the beneficiary of FRA 2006 on a long term basis.

5. Forest types over the years have changed due to various anthropogenic and natural factors. Revisit of Forest types have been taken up to generate baseline information and develop change matrix and to understand the impact of climate change on forest vegetation to evolve appropriate mitigation strategies for the future.

6. Research is to be undertaken in frontier areas of forestry like climate change, nanotechnology, tree improvement with DNA finger printing and genetic engineering for desired traits.

Further to harness and collate innovative and out of box ideas and inputs for improving research system '**Think Tank**', '**Ginger Group**' and '**Knowledge Pool**' of eminent foresters and scientist have been established in ICFRE, whose inputs are suitability incorporated in the research programs.

I am sure that this document will be a guiding force for the Forestry Research in ICFRE in coming years. I congratulate Sh. Sandeep Tripathi, DDG (Research), Dr. Vimal Kothiyal, Scientist G/ADG(Research Planning) and Dr. Sushma Mahajan, Scientist F/ Special Director (RP) for their hard work in bringing the scattered and piece meal projects into the National Programmes as All India Coordinated Projects/ Inter institutional Projects and Networking Projects. I also congratulate all the Directors of the ICFRE institutes, NPDs and Nodal Officers for the formulation of these programmes.



(Dr V.K Bahuguna)
Director General

Preface

Sandeep Tripathi
Deputy Director General (Research)

ICFRE research planning process is broad based participatory system involving equitable participation of all the group of research end users, researchers and research managers, envisaged through stakeholders meetings at state headquarters under the jurisdiction of the ICFRE institutes, Research Advisory Group (RAG) Meetings at eight research institutes of ICFRE and Research Policy Committee (RPC) meeting at national level gives final approval to the research proposals which are recommended by the RAG of the respective institute. RPC ensures the balance among international, national, regional and state research requirements and decide investments in high quality research giving priority for livelihood support.

ICFRE has significantly revised its research focus recently to enable its direct linkages to the society and community for their livelihood issues, specifically rural tribal poor and marginal section of the society, apart from looking after contemporary issues of forest management and other stake holders. The linkage with Panchayati Raj institutions is another major shift in ICFRE research planning system. To make the research inputs relevant to contemporary issues of society and stakeholders, the RPC 2012 took a hard look on the research proposals of various institutes of ICFRE, deliberated earlier in the RAGs of the institutes.

In the XIII RPC Meeting, it was decided unanimously that ICFRE research system will tune its research towards programme mode for optimally utilizing the talent and services of the scientists with the available budget. For the purpose 4 Thrust Area of research i.e. Managing Forests and Forest Products for Livelihood Support and Economic Growth; Biodiversity Conservation and Ecological Security; Forests and Climate Change; and Forest Genetic Resource Management and Tree Improvement were finalized. Apart from these 4 thrust areas, two thrust areas, one for education and one for extension were also formulated. The NPDs, NSMCs and Chief Project Coordinators for AICPs/Networking and Inter institutional Projects were also identified. The NPDs coordinated, prepared and presented the AICPs/Networking/Inter Institutional Projects in the RPC and would have the technical and Administrative control of respective thrust area. National Subject Matter Experts (NSMC) inputs were given to NPDs. NPDs collated and coordinated with the Chief Project Coordinators/ Directors and other scientists. All the National Project Directors (NPDs) interacted through video conferencing on regular basis. The Chief Project Coordinators were made responsible for the execution of AICPs/Networking/ Inter Institutional Projects and are the head of these projects. The details of prioritised program and components are presented in this document.

I believe that the compendium containing the changing frontiers of research system in ICFRE will give a new direction to the Forestry research system of ICFRE. The Programmes identified will be tuned and improved regularly with my support team. I appreciate the efforts and contribution of all the Directors of the ICFRE institutes, NPDs, Nodal Officers, NSMCs and scientists for the formulation of these programmes. I acknowledge contribution of Dr. Vimal Kothiyal, Scientist G/ ADG (RP) and Dr. Sushma Mahajan, Scientist-F/ Special Director (RP) for finalisation of this document.

Sandeep Tripathi
Deputy Director General (Research), ICFRE

Executive Summary

Forest plays vital role in ecological, environmental and food security in addition to bio-diversity conservation and maintenance of water balance in ecological system. Benefits derived from forests are diverse and therefore research in the field needs to be holistic/interdisciplinary and which addresses the needs of society and community. ICFRE and its institutes have therefore revised the entire thrust of its research and now focusing on areas/issues which are linked to sustainable development for the well being of society and communities. Such approach of research demands inclusive efforts from the organisations having similar type of activities. Number of new initiatives are therefore taken on the behest of Dr V.K Bahuguna, Director General, ICFRE to cater to such emerging needs and challenges. Inter-disciplinary/inter-institutional groups of foresters/scientists from ICFRE as well as from forestry related organisation are formed to provide communication platforms and infuse new thinking and approaches in the forestry research system. ICFRE recently has taken a step forward by forming different groups. The **'Think Tank'** is a nationwide representation of eminent foresters and scientists to infuse new thinking and address the gaps between forestry and research. The **'Ginger Group'** comprising of ICFRE scientists is expected to think beyond the traditional concept to bring 'innovative ideas and out of box thinking' for solving the problems of consumers on the issues relating to emerging challenges of forestry science. The **'Knowledge Pool'** is a consultative group of field foresters at ICFRE created for solving the contemporary problems of forest management in the country focusing primarily on the issues related to rural poor, tribals and other marginal sections of the society. **'Direct to Consumer'** is a new scheme being implemented to take the research forward directly to consumer / end user.

In the XIII Research Policy Committee (RPC) Meeting held on 14th-16th February 2012, it was decided by the house unanimously that the ICFRE Research System will be shifted from small project mode research to programme mode research system under which All India Coordinated Projects (AICPs), Networking Projects and Inter-Institutional projects will be formulated. For this purpose six National Project Directors (NPDs) were designated from the existing officers/scientists of ICFRE/FRI.

Director General, ICFRE in tune of such revised focus has made significant change in its research strategies so that research may have direct links with the community and society. The new project proposals submitted to the XIII RPC were deliberated among RPC members and after a logical segregation and merging of these proposals, All India Coordinated Projects (AICPs), Networking Projects and Inter-Institutional projects were decided to be formulated. As a follow up the concerned scientists and officers of the ICFRE and its institute have formulated 21 national level programs having sub components in each program.

Research plan of programs developed by NPDs include short term (at least five years), medium term (at least seven to eight years) and long term goals (at least ten years) and the components falling into these programmes were taken up, apart from few research projects important from scientists/area specific importance point of view. NPDs played significant role in collating and coordinating the information on these programs. The same was presented in the follow up meeting of the XIII RPC meeting held on 11th May 2012.

The summarised information under these Thrust Areas of the approved programs is as under:

Thrust Area I: Managing Forests and Forests Products for Livelihood Support and Economic Growth

National Project Director, Ms. Neelu Gera, presented the programmes under this Thrust Area. A total of **7** programmes with **57** components with a budget outlay of **Rs 813.51 lakhs** under this thrust area were presented. Budget requirement for the current year was **Rs. 289.12 lakhs**. All the components were appreciated by the RPC, however, due to budget constraint, only **33** priortized components were approved to be started in 2012-13. The remaining components are proposed to be taken up subsequently depending on the budget availability. Thus, under Thrust Area I: **33** components with budget of **Rs 75 lakhs** for 2012-13 were approved.

Thrust Area II: Biodiversity Conservation and Ecological Security

National Project Director, Dr. Veena Chandra, presented the programmes under this Thrust Area. A total of **7** programmes having **22** components with a budget outlay of **Rs 1843.14 lakhs** under this Thrust Area were presented. All the components were appreciated by the RPC, however, due to budget constraint for the current year only **9** priortized components were approved to be started in 2012-13. The remaining components are to be taken subsequently depending on the budget availability. A new project on Rare and Endangered species of Himachal Pradesh, Sikkim, Arunachal Pradesh, and Manas in Assam was decided to be formulated. Another Networking project on Bio Prospecting along with ICMR was decided to be formulated. It was also decided to formulate AICPs on lac, tussar and honey involving local communities, depending upon the area suitability to address the livelihood concerns on forestry based natural resources. Thus, under Thrust Area II: **9** components with budget of **Rs 33.00 lakhs** for 2012-13 were approved.

THRUST AREA III: Forest and Climate Change

National Project Director, Shri M.P. Singh presented the programme under this thrust area. The NPD has formulated a comprehensive long term AICP (at least of ten years) on "Coordinated Climate Change Forestry Research Program" having Impact, Adaptation and Mitigation programs and **18** components with a total budget outlays of **Rs. 125 crore**. In addition to this one programme on Forest Types and two additional components were added. Thus a total of **4** programmes including reassignment of Forest Type of India project (3+1) with **21** subcomponents with total budget of Rs**. 235 lakhs** for the current year were presented. Only **3** sub components of Impact program with budget of **Rs. 35 lakhs** for 2012-2013 under which Pilot studies will be carried out by FRI, Dehradun to finalize the methodologies for it's up scaling and replication in other institutes later were approved. Subsequent projects will be developed after the finalization of methodologies from the outcome of the pilot projects. **Rs. 101 lakhs** was approved for the reassignment of Forest Types of India Project. Thus an amount of **Rs. 136 lakhs** was approved for this programme.

THRUST AREA IV: Forest Genetic Resources Management and Tree Improvement

National Project Director, Dr H.S. Ginwal presented the programme under this thrust area. The NPD has formulated long term (at least of ten years) AICP on "Forest Genetic Resource Management and Tree Improvement for Better Productivity of Goods and Services from the Forests" with a total budget outlay of **Rs 53.93 crores** for this AICP. A total of **129** components with budget of **Rs.505.40 lakhs** was presented under this thrust area. For the current year, **Rs. 80 lakhs** were approved under **7** components. Remaining components would be taken up subsequently depending upon the budget availability.

THRUST AREA V: Forestry Education and Policy Research to Meet Emerging Challenges

National Project Director, Shri R.K. Dogra presented the programme. DG, ICFRE desired that a long term programme with detailed modalities for its execution under this thrust area may be formulated integrating Forestry Universities in ICFRE research systems. NPD would also formulate an All India Coordinated project on NTFPs quantification and evaluation including 5 to 6 important NTFPs with agriculture Universities and other Universities of the country and NTFP Division of FRI, Dehradun in the first phase.

Thrust AREA VI: Forestry Extension for Taking Research to People

National Project Director, Shri R.P. Singh presented the programme under this thrust area with budget outlay of **Rs. 8.45 lakhs** with **3** components. DG, ICFRE desired that this programme may be reformulated by the NPD. The New programme may include some good completed research projects of last three years with scope of extension of these results for the stakeholders/end users like SFDs, Industries, common man and advised to add 'Direct to Consumers' involving Gram Sabah and Gram Panchayat also in the programme.

The RPC approved a budget of **Rs. 293 lakhs (2.93 crore)** for ongoing projects for 2012-13. RPC authorized the Directors of the institutes to use this budget for the ongoing projects along with the projects which needs extension with in this amount and were to be reviewed in July 2012, depending on availability of additional funding.

A total budget of **324 lakhs (3.24 crore)** was approved by RPC for the year 2012-13 for the New Projects/Programmes. **Rs. 75 lakhs** for Thrust Area I, **Rs. 33 lakhs** for Thrust area II, **Rs. 136 lakhs** for Thrust Area III (including **Rs. 101 lakhs** for Forest Type Project) and **Rs. 80 lakhs** for Thrust Area IV was approved by RPC for the year 2012-13.

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1 INTRODUCTION

Indian Council of Forestry Research and Education (ICFRE) is the premier Forestry research organization of the country and has been undertaking the holistic development of forestry research, extension and education through need based planning covering all aspects of forestry through its fleet of eight Research Institutes and four Research Centers. The Council deals with the solution based forestry research in tune with the emerging issues in the forestry, including global concerns such as climate change, conservation of biological diversity, combating desertification, and improvement of productivity of the forests, rehabilitation of degraded lands, and sustainable management with development of resources. The Director General, ICFRE embarked upon to revisit the focus of research system of ICFRE and to design them in such a way that the research has direct links with the community and society. It has also been emphasized that the research program should address the problems of livelihood of rural poor, farmers, tribal and other forest dependent communities apart from meeting needs of goods and services from forests and trees outside forests (TOF).

1.1 Mandate and Functions of Consultative Groups formed for improving research system

To improve the research system in tune with such research focus, ICFRE initiated discussions and deliberations on contemporary research issues by forming different groups like **Think Tank**, **Ginger Group and Knowledge Pool. 'Direct to Consumer'**, a new scheme is launched implemented to take the research forward directly to consumer/end user. National Subject Matter Co-ordinators (NSMCs) have also been designated to prepare 35 State of Knowledge Reports (SKRs) on various facts of forestry research.

1.1.1 ThinkTank

A Nationwide representation of scientific force to bring together eminent foresters and scientists from all over the country to infuse new thinking and address the gaps between forestry and research under the Chairmanship of Director General, ICFRE **(Enclosure 1).**

1.1.2 Ginger group

A Consultative group of ICFRE scientists to think beyond the traditional concept of stakeholder/ demand driven/need driven research concepts has been created to bring 'innovative ideas and out of box thinking' for solving the problems of consumers on the issues relating to emerging challenges of forestry science. The group is used to prepare technical reports, bulletins, books and brochures and documents relating to Forestry Science/ Research/ Education/Extension **(Enclosure 2).**

1.1.3 Knowledge Pool

A Consultative group of field foresters at ICFRE has been constituted to bring about innovative ideas for solving the contemporary problems of forest management in the country with special focus towards solving the problem of rural poor, tribals and other marginal sections of the society. The knowledge pool would also strive to improve the communication between scientists, research workers and consumers/ stakeholders of research **(Enclosure 3).**

1.1.4 National Subject Matter Coordinators (NSMCs)

Thirty five numbers of NSMCs are identified to develop systematic approach paper on various subject matters and would compile a 'State of Knowledge Report' on each assigned theme. They are

expected to develop site specific and subject specific research programmes and coordinate research, extension and marketing activities in the identified theme. The list of National Subjected Matter Experts nominated in 35 thematic areas is at **Enclosure 4.**

1.1.5 National Project Directors (NPDs)

To improve upon research planning system of ICFRE, National Project Directors are designated recently to steer research in program mode in six identified thrust areas falling under broad areas of research, education and extension. Role of NPDs is important in integrating research efforts of ICFRE institutes within the ambit of ICFRE research planning system for next 15 to 20 years. The Thrust Area wise National Project Directors (NPDs) are given at **Enclosure 5**.

1.1.6 Direct to Consumer Scheme

Research communication is a two way process. The forest officers are vital link between linking research and management practices in the field of forest conservation/development and forest based livelihood, while the work of ICFRE scientists/professionals is to transfer research results to the field to meet the emerging challenges of climate change, forests and water security and biodiversity conservation etc., by amalgamation of efforts of both. The envisaged step is to enhance the outreach of the research findings so that the extension of research makes immediate impact of research in the field. The 'Direct to consumer scheme` has been launched for immediate transfer of recently developed technologies to the consumers.

1.2. Task force to undertake a comprehensive study on assessment of Forest Types of India

Management of the forest is another area where ICFRE inputs are important for sustainable utilisation of resources. Over the years the classifications of forest done by Sir H.G. Champion (1936) and revised by Sir H.G. Champion and S.K. Seth (1968) have changed due to various anthropogenic and natural factors. Revisit of Forest types have been taken up to develop change matrix for which a Task Force has been formulated **(Enclosure 6).** The prime objective of revising Forest type of India is (i) to understand the impact of climate change on forest vegetation (ii) to devise a forest classification from management perspective (iii) to develop a forest classification system in line of international organizations like FAO for better understanding of Indian forest perspectives in the international forums and (iv) to prepare a change matrix of forest types of India.

1.3 Human Resource Development (HRD)

Motivated human resource is an important ingredient for the effective implementation of the policy initiatives. To meet the new and emerging challenges as per revised focus of ICFRE research, a new HRD policy has been formulated for creating an in house corpus of trained researches and managers to achieve scientific breakthrough in the face of complex forestry challenges of today and future.

1.4 Integration with Panchayti Raj Institutions

One of the major shifts in research planning and prioritisation is to seek linkages with Panchayti Raj Institutions in the country. For improving the livelihood status for forest fringe communities, a project funded by National Rainfed Area Authority (NRAA) has been taken up for qualitative and quantitative assessment of the forestlands and ecological and productivity status of such lands situated in the forest fringe villages of 275 rain-fed districts of India comprising 310,416 villages of 26 States and one Union

Territory. To implement the people centric research emphasis is also being given to lac, tussar and honey cultivation. MFP bazaar rates information system has also been developed for economic gains of forest dependent communities.

1.5 National Stakeholder Consultation: Organization of First Indian Forest Congress

To deliberate upon issue of forest governance and management of priceless natural resource in a sustained manner and to have input for formulation of appropriate research methodologies, **First Indian Forest Congress** was organized by ICFRE in November 2011. This was a major step in shaping the future strategy for sustainable management of the forests resources by forest managers with active people participation. The Congress was a great success wherein eminent foresters, scientists, professors and student delegates apart from Joint Forest Management Committee (JFMC) members also participated and as an outcome a 17 point :**Indian Forest Congress Charter 2011'** has been adopted **(Enclosure 7).**

1.6 Tree Improvement and Productivity

ICFRE has historical contribution for improving the productivity of tree outside forest system by developing and releasing improved clones/variety of eucalyptus, poplar, shisham etc during last 2-3 decades. The apex body-Variety Releasing Committee (VRC) constituted to institutionalize the registration of superior varieties and clones on a uniform basis in forestry sector throughout the country as per "Guidelines for Testing and Releasing of New Tree Varieties and Clones", released one improved clone each of Shisham (*Dalbergia sissoo*) FRI- DS-14 and *Eucalyptus* hybrid FRI-EH-001 developed by Forest Research Institute, Dehradun for commercial cultivation. Also elite clone of *Eucalyptus camaldulensis* (IFGTB-ECI, IFGTB-EC2, IFGTB-EC3, IFGTB-EC4) and *Casurina equisetifolia* (IFGTB-CE1, IFGTB-CE2, IFGTB-CE3, IFGTB-CE4) developed by IFGTB were also released by VRC.

1.7 Research Planning System

ICFRE's Research Planning Process is a bottom up, transparent and participatory in nature as per the thrust areas identified through a detailed research priority methodology documented in National Forestry Research Plan (NFRP), 2000 with the vision for twenty years. After taking stock of country's wide research needs it enlisted the research priorities of the whole nation and prioritized the research themes for each institute under ICFRE, through Research Advisory Group (RAG) and Research Policy Committee (RPC) with in-built mechanism of periodic review. Equitable participation of all groups of research users, researchers and research managers is envisaged through stakeholders meet, RAG and RPC.

1.7.1 Research Prioritization

Setting research priorities is essential to focus research on needs and utilize scarce resources optimally but, the availability of limited resources viz., finance, human resource, research infrastructure and the diverse and competitive research needs in terms of discipline and local, national and international necessity, bring setting priorities at central stage of research planning. ICFRE has recognized the critical importance of setting research priorities to make rapid stride in forestry research. To improve upon the Research Prioritization process, continuous efforts are being made in ICFRE keeping in view the changes in National and International level. Rolling Research Plan for five years with a provision of review every year by RAG and RPC to react to unforeseen developments/unanticipated changes like emerging themes, interim results and resource availability. 'Thrust areas' of research from seven has been reduced to four to have

national impact of research of ICFRE. Recently National Project Directors for these four Thrust Areas have been designated from the existing manpower to have focused endeavour. Also one Thrust Area of Education and one of Extension with each NPD have been formed.

1.7.2 Research Advisory Group (RAG)

The research projects are being prepared by researchers along with associates in the ICFRE Institutes. The projects are recommended by the Research Advisory Group (RAG) at the institute level which is advisory in nature. Each institute conducts its RAG annually. The projects recommended by the RAG members are finally put up to the RPC for final approval. In order to make research responsive to stakeholders needs, the constitution of RAGs has been recently revised, Directors of the institutes as Chairman of RAGs. The tenure of nominated members of the RAG shall continue to be for two years. The constitution of the RAGs is as:

Composition of RAG of the Institutes

1.	Director of the Institute	Chairman
2.	PCCFs of all other concerned States / UTs or representatives	Members
3.	ADG (Research Planning)/DG's representative, ICFRE	Member
4.	Three scientists of the Institutes at senior, middle and junior level	Members
5.	Two Foresters (one each at CF and DCF level from Institute)	Members
6.	Representative of the Universities imparting education in forestry and allied subjects at the level of Dean or Head of the Department	Member
7.	Two representatives of funding organizations	Members
8.	Representative of prominent NGO in the field of forestry	Member
9.	Representative of forest based industries	Member
10.	Eminent forester outside ICFRE	Member
11.	Eminent scientist outside ICFRE	Member
12.	Representative of Progressive Farmer	Member
13.	Representative of ICAR	Member
14.	Heads of State Forest Research Organizations of the concerned States	Members
15.	Representative of sister organization	Member
16.	Representative of JFM / Local Government /grass root level organization	Member
17.	Group Coordinator (Research)	Member Secretary

1.7.3 Research Policy Committee (RPC)

Research Policy Committee (RPC) is the apex body for research under the Chairmanship of DG, ICFRE to provide policy direction to the Council, introduces innovation in research, ensures balance among international, national, regional and state research requirements and decides investment in high quality forestry research. RPC sets research priorities of ICFRE and its institutes. RPC is expected to provide research leadership so as to make ICFRE a model research organization with international leadership in forestry research. RPC has composite composition of research managers, research users and researchers.

The functions of RPC include review of national and regional objectives of the council, research projects, prioritization of research projects, management of resources base, promote effective coordination among various institutes of ICFRE, establishing synergic alliance with other agencies engaged in forestry research and virtually to guide the direction of forestry research of India. The constitution of RPC is as:

Composition of RPC of ICFRE

1.	Director General, ICFRE	Chairman
2.	DDGs (Education, Extension and Administration), ICFRE	Members
3.	Director (IC), ICFRE	Member
4.	All Directors of ICFRE Institutes	Members
5.	Representative of sister organizations (WII, FSI and BSI)	Members
6.	Representative of forest based industries	Member
7.	Representative of prominent NGO in the field of forestry	Member
8.	Two eminent foresters outside ICFRE	Members
9.	Two eminent scientists outside ICFRE	Members
10.	Two scientists of the Council each at level of Scientist 'F' or above and Scientist 'E' or below	Members
11.	One forester of the ICFRE	Member
12.	Representative of ICAR	Member
13.	Representative of Planning Commission	Member
14.	Representative of MoEF	Member
15.	Representative of University imparting forestry education at the level of Dean or Head of the Department	Member
16.	Representative of Progressive Farmer	Member
17.	Representative of Local Government /JFM	Member
18.	ADG (Research Planning)	Member
19.	DDG (Research), ICFRE	Member Secretary

1.7.4 Revisit of Research Prioritization Process of ICFRE

In view of the massive research support needed for the forestry sector and limited resources a need to optimize the research outputs with the available scare resources was felt. The inputs of various forums, platforms and initiatives were synthesised to embark upon the path of revised focus of ICFRE research system. The research priorities of ICFRE was accordingly revisited and four research thrust areas and thirty five themes have been identified recently under the leadership of Dr. V. K Bahuguna, DG ICFRE who had given creative thinking a major push to revise the research priorities. Two thrust areas, one each for education and extension with four themes each have also been identified. The planning on prioritized thrust areas would help in optimum resource allocation, minimized sub optimal utilization of resources, minimized duplication of efforts and minimized regional and sectoral imbalances in the research endeavours.

Following are the revisited Thrust areas along with the themes for ICFRE. These have been finalized after in-house meetings and deliberations. For institutionalizing the activity in each Thrust area, National Project Directors have been designated.

Thrust Areas (4+2)	Themes (35+8)
A. Research	
1. Managing Forest and Forest Products For Livelihood Support and Economic Growth 2. Biodiversity Conservation and Ecological Security 3. Forests and Climate Change 4. Forest Genetic Resource Management and Tree Improvement.	• Silviculture • Social Forestry, Agro-forestry, Farm Forestry • Sustainable Forest Management (SFM) • Forest Economics • Forest Biometrics and Yield Modelling • Participatory Forest Management • Wood Science and Technology • Chemistry of Forest Products • Wood based Industries • NTFP Resource Development • Bio-prospecting and Bio-piracy • Seed Science and Technology • Forest Certification • Forest Hydrology • Food Security • Bio-fuels and Bio-energy • Integrated Pests and Disease Management • Application of Microbes in Forestry • Weeds and Invasive Species • Forest Fire and Grazing • Bio-informatics and Geo-informatics • Policy and Legal Issues • Biodiversity Conservation • Forest Botany • Ethinic and Traditional Knowledge Systems • Forest Soils and Land Reclamation • Wetland and Marine Ecology • Watershed Management • Climate Change and Forests • Forest Ecology • Conservation of Forest Genetic Resources • Tree Improvement • Vegetative Propagation • Biotechnology • Environment Management
B. Forestry Education	
Forestry Education and Policy Research to Meet Emerging Challenges	• Improving Formal Forestry Education • Accreditation of Universities • Networking Forestry Education with Research and Extension • Capacity Building of Scientific and Management Cadre
C. Extension	
Forestry Extension for Taking Research to People	• Collection, Compilation and Publication of forestry reports / journals • Dissemination of developed technologies • Evolving and coordinating comprehensive extension strategies in Forestry Research • Consultancy services

2 Changed Frontiers of Research Programs Based on XIII RPC

To expand the vistas of forestry research initiation of new programmes from 2012-13 has been taken up under the leadership of DG, ICFRE. The Director General in the meeting of XIII RPC held on 14th -16th February 2012 opined that ICFRE research programs must have forward and backward linkages to maintain the continuity of research in a manner that the output of one scientist becomes input of other scientist. He stressed that future research has to be taken up in the program mode by interdisciplinary team work and should focus on the needs of the society though few research projects of region specific and scientific pursuits may be continued. As the resources are limited with ICFRE, piece meal research should be stopped and research priorities for the future are to be chalked out keeping in mind these constraints. He also expressed his views that it is high time for ICFRE to change its research strategies which must be designed in such a way that research may have links with the community and society. He stressed that the new project proposals in the present form may be deliberated among RPC members and after a proper segregation and merging of these proposals, All India Coordinated Projects (AICPs), Networking Projects and Inter-Institutional Projects may be formulated.

2.1 Deliberations of XIII RPC, 14th-16th February 2012

In the XIII Research Policy Committee Meeting (RPC) held on 14th-16th February 2012, 110 New Research Proposals amounting Rs 2059.8 Lakhs from the eight research institutes, were placed for discussions and final approval by the house. The details are provided in Table 2.1 below:

Table 2.1: Thrust Area Wise / Institute wise status of new research projects (Rs. in lakhs)

THRUST AREA	FRI	IWST	IFGTB	IFP	TFRI	AFRI	RFRI	HFRI	Total Projects	Total Budget
Managing Forest & Forest Products for Livelihood Support & Economic Growth	24	5	1	2	6	4	3	5	50	674.3
Biodiversity Conservation & Ecological Security	3	0	1	1	11	1	4	3	24	333.3
Forests and Climate Change	4	0	1	0	1	0	0	1	7	209.3
Forest Genetic Resource Management and Tree Improvement	8	0	11	1	3	2	4	0	29	842.9
Total Projects	**39**	**5**	**14**	**4**	**21**	**7**	**11**	**9**	**110**	**-**
Total Budget	**597.5**	**47.2**	**428.1**	**124.2**	**219.6**	**228.5**	**247.3**	**167.5**	**-**	**2059.8**

After detailed deliberations in the RPC it was decided by the house that all the small projects recommended by the RAGs be segregated and merged in to All India Coordinated Projects (AICPs),

Networking Projects and Inter-Institutional Projects to make appropriate research impact. After two days of exhaustive deliberations in the RPC, the project proposals submitted to XIII RPC were segregated and merged to categorize into All India Coordinated Projects, Networking projects, Inter Institutional, and Region specific and projects of scientific pursuit. The basis followed for segregation of these projects was as under:

- AICP: Projects involving all institutes of ICFRE and collaboration with organizations and Universities outside ICFRE
- Network Project: Projects involving some institutes of ICFRE and collaboration with other organization and Universities outside ICFRE
- Inter-Institutional Projects: Projects involving some institutes of ICFRE
- Specific Project: Projects which are region specific and taken up for scientific pursuit for developing new fields
- PPP mode Projects: Public-Private Partnership projects

It was also deliberated that implementation mechanism should be very strong and ICFRE research document for the next 10-15 years needs to be finalized. The deliberations highlighted that following topics may be included in the future research programs:

- AICP on Agroforestry
- AICP on Value Addition of NTFP
- AICP on Biodiversity Conservation and Ecological Security
- AICP on Ecosystem Services from Forest of Eastern and Western Ghats
- AICP on Forest Fringe Area (Assessment of capacity of forest fringe to impart livelihood support through NTFP, water, fodder, fuel, biodiversity, grazing in different agro-climatic zone; dry / temperate / costal India and Western Ghats. Other projects of different thrust areas may be included in the present ongoing project on Forest Fringe at FRI and a separate bigger project on fringe area be formulated
- AICP on Eucalyptus, Teak, Bamboo, *Melia dubia*
- AICP on Forest Invasive Species (involving its chemistry and extension)
- Project on *Cordyceps sinensis* for possible funding from Planning Commission
- Extension project on VVK and KVK integration
- Project on Education and Policy Research
- Project Concept Note (PCN) for CAMPA funding for Tree Improvement and related programmes
- Inter institutional project on *Dalbergia latifolia*, *A. nilotica*
- PPP mode project on germplasm assemblance and multi-location trials on *Leucaena leucocephala*
- Project on Nano particles / Nano technology
- Network project on mechanization for small machinery, logging, agro-forestry and other applications
- Project on Seabockthorn and Juniperus
- Research on propagation of wild fruits
- EIA project for eco-restoration integrating research related CBDS
- Project on Self Help Group in FRI Dehradun for welfare activities

DG, ICFRE in his remarks stated that National Project Directors of concerned research Thrust Area in consultation with Directors and scientists would formulate the detailed research programme. Research plan of projects by NPDs should include short term, medium term and long term goals of at least ten years and the projects falling into these programmes should be taken up apart from few research projects

important from scientists/area specific point of view. Director of concerned Institutes (in some cases senior scientists) will be the **Chief Project Coordinator** of the projects and similar designation may be worked out for scientists involved in pursuit of components **(Project Coordinators or Co-project Coordinators / Associate)**. NPDs would collate and coordinate research projects in respective thrust areas. Chief Projector Coordinators will be responsible for execution of the specific project. Stress was also given by DG, ICFRE to institutionalize the contribution of scientists in AICP/ and other projects. It was decided that a committee may be formed to finalize the same. The project proposals would be routed through the NPDs to the Directorate of Research. It was decided that the ongoing projects of the institutes are to be tuned with the new AICPs / Network projects/ Inter-institutional projects by the Directors and all the other projects not suiting to above requirements except projects of regional and specific scientific pursuit would be discontinued.

Based on the above deliberation, tentative grouping of the 110 project received in four thrust areas was done to guide the NPDs, Directors, Nodal officers and concerned scientists for the formulation of AICP, Networking projects, Inter Institutional and projects of region specific and scientific pursuit. It was also deliberated that in addition to 110 projects submitted new components of relevance can also be added. Thrust areas wise summary of the project proposals segregated and merged is discussed in detailed in the Chapter on **"Decision of XIII RPC (Part I): Segregation of projects"**. The grouping was tentative in nature and only to facilitate NPDs to form projects proposals and would have to be redrafted to fit into AICPs, Networked PPP and inter-institutional projects of ICFRE and be placed before the next follow up RPC for approval. The frame work and titles of these programmes as AICP, Networking projects, and Inter Institutional projects were finalized in each Thrust Area along with Nodal Institute. Some of the projects of extension nature were grouped under the Thrust Area of Extension. NPDs of Extension and Education were asked to formulate programs in due course for the respective thrust areas. Following is the broad listing of AICP/Networking/PPP/ stand alone programs to be undertaken in respective Thrust Areas:-

THRUST AREA 1: Managing Forest & Forest Products for Livelihood Support and Economic Growth

- All India Coordinated Project on Agro forestry (Nodal: FRI).
- All India Coordinated Project on bamboo for processing, value addition and skill development (Nodal: RFRI)
- Chemistry of Forestry Resources including invasive species for Value Addition (Network project with Universities, Industries and chemical laboratories) (Nodal: FRI)
- Inter-Institutional Project on *Melia Composita* for processing and value added products (Nodal: FRI)
- Networked project on 'Non timber forest resource value addition for livelihood generation' (Nodal: TFRI)
- Inter institutional project on Forest Protection (Nodal: FRI)
- Inter institutional Coordinated Projects on Wood science for processing and value added projects (Nodal: IWST)
- Stand alone projects (specific project) on Imported timbers (IWST).

THRUST AREA II: Biodiversity Conservation & Ecological Security

- All India Coordinated Project on Silviculture of Indian Species (Nodal: FRI)
- Networking Project on Restoration and Reclamation on Degraded Site (Nodal: FRI)
- All India Coordinated Project on Invasive Species (Nodal: FRI)
- Networking Project on Rare and Endangered Species (Nodal: FRI)

- Networking Project on Nursery Technique (Nodal: FRI)
- Networking Project on Seed Technology (Nodal: FRI)
- All India Coordinated Project on Biodiversity and Bio-prospecting
- Stand alone specific project

THRUST AREA III: Forest & Climate Change

- Impact Component
- Adaptation Component
- REDD+ and Mitigation Component
- Reassignment of Forest Types

THRUST AREA IV: Forest Genetic Resource Management and Tree Improvement

- Tree improvement and breeding for improved productivity and adaptability
- Forest Genetic Resource Evaluation and Conservation
- Applied Genomic Research and genetic engineering for desirable traits

Subsequently 1st follow up meeting was chaired by DG, ICFRE through video conferencing on 1st March, 2012 with the NPDs, Directorate of Research, Directors of the Institutes and Nodal Officers. 2nd and 3rd follow up meeting held on 4th April, 2012 and 14th April, 2012 were chaired by DDG(R) to coordinate and review the progress of the formulation of All India Coordinated Projects/ Net working and Inter Institutional Projects on these Thrust areas. Programmes were finalised for their approval in the follow up meeting of 11th May, 2012 at ICFRE headquarters.

3 Decision of XIII RPC (Part I) : Segregation of Projects

As per the decision taken in the first meeting of XIII RPC held on 14th -16th February 2012, the 110 projects from different institutes were segregated into six Thrust Areas. Under each thrust area these projects were further grouped into programs. Some of the projects of XII RPC 2011 which were non starters due to unavailability of sufficient funds but fitted into present scheme of thought were also grouped for formulations of programs with components and sub-components. Few new components were also added while finalizing the programs to fulfil the broader objectives of research. The sub projects of the All India Coordinated Projects, Networked and Inter-institutional projects are referred as **components** here after.

Thrust areas wise summary of the proposals segregated and merged is given below. The grouping was tentative in nature and done to facilitate NPDs to form projects proposals. These projects were redrafted to fit into AICPs, Networked PPP and Inter-institutional projects of ICFRE and were placed before the next follow up RPC on 11th May 2012.

3.1 THRUST AREA 1: Managing Forest & Forest Products for Livelihood Support and Economic Growth

Following All India Coordinated Project, Networking project and Inter institutional project to be formulated in this thrust area:

Project 1: All India Coordinated Project on Agro forestry (Nodal: TFRI).

Project 2: All India Coordinated Project on bamboo for processing, value addition and skill development (Nodal: RFRI)

Project 3: Chemistry of Forestry Resources including invasive species for Value Addition (Network project with Universities, Industries and chemical laboratories) (Nodal: FRI)

Project 4: Inter-Institutional Project on *Melia Composita* for processing and value added products (Nodal: FRI)

Project 5: Networked project on 'Non timber forest resource value addition for livelihood generation' (Nodal: TFRI)

Project 6: Inter institutional project on Forest Protection (Nodal: FRI)

Project 7: Inter institutional Coordinated Projects on Wood science for processing and value added projects (Nodal: IWST)

Project 8: Stand alone project (specific project) on Imported timbers (IWST).

3.1.1 All India Coordinated Project (AICP) on Agro forestry (Nodal Institute: TFRI, Jabalpur)

Following projects of the ICFRE institutes were segregated and merged in this AICP on Agro forestry:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in Lakhs)
1.	Trials of *Acacia mangium* to find out suitability of the species for Uttar Pradesh. **(FRI, Dehradun) /Dr. B. K. Pandey, Sci. D**	2012-2017 (5 Years)	17.48
2.	Regeneration studies of *Acacia nilotica* sub-sp. cupressiformis and *Hardwickia binata*. **(FRI, Dehradun)/ Anita Tomar, Sci. C**	2012-2016 (4 Years)	2.36
3.	Developing agroforestry model on degraded land of farmers in Uttarakhand. **(FRI, Dehradun)/Dr. Charan Singh, Sci. C**	2012-2017 (5 Years)	8.00
4.	Developing Poplar based Silvi-Medico agro forestry model for foot hills of Uttarakhand. **(FRI, Dehradun)/Dr. Charan Singh, Sci. C**	2012-2017 (5 Years)	5.00
5.	Multilocational trial on clones of *Poplar deltoids* in different Agro-climatic zone of Bihar, Jharkhand & northern part of West Bengal State. **(IFP, Ranchi)/Sh. Biplav Kumar Mishra, DCF**	2012-2016 (4 Years)	26.42
6.	Screening and evaluation of bamboo based silvi- medicinal system. **(TFRI, Jabalpur)/Dr. N. Berry Sci. D**	2012-2017 (5 Years)	15.86
7.	Evaluation of *Madhuca indica* based Silvi- agri system. **(TFRI, Jabalpur)/Dr. N. Berry Sci. D**	2012-2017 (5 Years)	11.65
8.	To study the effect of grass introduction in *Colophospermum mopane* and *Suaeda nudiflora* plantation to establish silvipastoral system and its influence on soil properties on arid salt affected land in Rajasthan. **(AFRI, Jodhpur)/Dr. Ranjana Arya, Sci.-E**	2012-2017 (5 Years)	24.64
9.	Documentation of neem products and their role in socio-economic upliftment of rural livelihood in Rajasthan and Gujarat. **(AFRI, Jodhpur)/ Smt. S. Tripathi, R.O.**	2012-2017 (5 Years)	21.47
10.	Managing resources to enhance productivity of Agroforestry system in dry areas of Rajasthan. **(AFRI, Jodhpur)/Dr. Bilas Singh, R.O.**	2012-2017 (5 Years)	24.00
11.	Role of agro forestry on community livelihood and carbon mitigation in lower hills of Himachal Pradesh. **(HFRI, Shimla)/ Dr. Vijender Pal Panwar, Sci. C**	2012-2017 (5 Years)	21.25

3.1.2 All India Coordinated Project on bamboo for processing, value addition and skill development (Nodal Institute: RFRI, Johrat)

Following projects of the ICFRE institutes were segregated and merged in this AICP on Bamboo:

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in Lakhs)
1	Management of fungal discolouration (molding) of bamboo for handicrafts, furniture and other utility items to help artisans. **(FRI, Dehradun)/Dr. N.S.K. Harsh, Sci. F**	2012-2016 **(**4 Years**)**	14.99
2	Studies on finishing aspects of *Dendrocalamus strictus*. **(FRI, Dehradun)/Dr. Kishan Kumar V.S., Sci. F**	2012-2014 (2 Years)	5.2
3	Effect of flowering on culm quality of *Dendrocalamus brandisii* and to explore its potential for making bamboo composite products**. (IWST, Bangalore)/Ms. Amita Pant, Sci. B**	2012-2015 (3 Years)	10.23
4	Capacity building, skill up-gradation of artisans and promotion of traditional bamboo handicraft and art with improved technology, suitable design and value addition. **(RFRI, Jorhat)/Dr. T. C. Bhuyan, R.O.**	2012-2015 (3 years)	25.28
5	Study on regeneration status of *Melocanna baccifera* (Muli Bamboo) in Tripura using remote sensing and GIS as tools. **(RFRI, Jorhat)/Shri Goutam Banerjee**	2012-2016 (4 Years)	25.57
6	Biomass, net primary productivity and site productivity of seven industrially important bamboo species in semi arid and humid tropics of Peninsular India. **(IWST, Bangalore)/Dr. S. Vishwanath, Sci. F**	2011-2014 (3 Years)	16.65
7	Selection of efficient AM fungi, PSBs and *Azaspirillum* for productivity enhancement of *Dendrocalamus strictus* & *Bambusa bambos*. **(AFRI, Jodhpur)/Dr. K. K. Shrivastava, Sci. F**	2011-2014 (3 Years)	15.35

3.1.3 Chemistry of Forestry Resources for Value Addition (Network project with universities, Industries and chemical laboratories) (Nodal Institute: FRI, Dehradun)

Following projects of the ICFRE institutes were segregated and merged in this AICP on Chemistry of NWFPs, Value Addition and Utilization:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in Lakhs)
1.	Utilisation of *Pinus roxburghii* needles for value added products. **(FRI, Dehradun)/Dr. Vineet Kumar, Sci. E**	2012-2015 (3 Years)	9.06
2.	Chemical interventions for utilization of *Eucalyptus* bark residue from wood conversion industries. **(FRI, Dehradun)/ Dr. V.K. Varshney, Sci. E**	2012-2015 (3 Years)	12.02

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in Lakhs)
3.	Studies on chemo enzymatic treatment of black liquor for recovery of reducing sugars. **(FRI, Dehradun)/ Dr. P. K. Gupta, Sci. E**	2012-2015 (3 Years)	9.10
4.	Structural studies and utilisation of *Acacia tortilis* gum exudates. **(FRI, Dehradun)/Dr. Vineet Kumar, Sci. E**	2012-2015 (3 Years)	9.16
5.	Chemical derivatization of α-cellulose into value added products. **(IWST, Bangalore)/Dr. S.S. Bisht, Sci. B**	2012-2015 (3 Years)	14. 36
6.	Evaluation of phyto polymers as ecofriendly bioadhesives. **(TFRI, Jabalpur)/Ms. Neelu Singh, Sci. E**	2012-2015 (3 Years)	9.91
7.	To study the variations in major phytochemical constituents of *Cyperus rotundus, Hemidesmus indicus, Phyllanthus amarus* and *Plumbago zeylanica* for quality produce from different agroclimatic regions of Chhattisgarh. **(TFRI, Jabalpur)/Dr. H. O. Saxena Sci. B**	2012-2015 (3 Years)	6.51
8.	Biochemical evaluation of germplasm of *Asparagus racemosus* and *Tinospora cordifolia*. **(IFP, Ranchi)/Sh. Pankaj Singh, R.O.**	2012-2015 (3 Years)	11.70

3.1.4 Inter-Institutional Projects on *Melia Composita* for processing and value added products (Nodal Institute: FRI, Dehradun)

Following projects of the ICFRE institutes were segregated and merged in this Inter Institutional Projects:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in Lakhs)
1.	Refinement in vacuum timber dryer designed by FRI and its performance studies. **(FRI, Dehradun)/Sh. N.K. Upreti, Sci. F**	2012-2014 (2 Years)	2.00
2.	Development of NIR spectroscopy based application methods for evaluation of physical and mechanical proper-ties of *Melia composita (syn. Melia dubia)*. **(FRI, Dehradun)/Dr. Vimal Kothiyal, Sci. F**	2012-2014 (2 Years)	6.00
3.	Study of effect of nano-clays as filler on physical and mechanical properties of Plywood. **(FRI , Dehradun)/Ms. Ismita Nautiyal, Sci. B**	2012-2015 (3 Years)	4.5
4.	Insect pest of *Melia composita* (Willd) and management of important insects by eco-friendly methods. **(FRI, Dehradun)/Dr. K.P. Singh, Sci.C**	2012-2016 (4 Years)	13.48

3.1.5 Net worked project on 'Non timber forest resource value addition for livelihood generation' (Nodal Institute: TFRI Jabalpur)

Following projects of the ICFRE institutes were segregated and merged in this Network Projects on Non timber forest resource value addition for livelihood generation.

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in Lakhs)
1.	Quantification, value addition of NTFP and improved agricultural productivity to enhance livelihood opportunities in tribal belt of Sirohi District of Rajasthan **(AFRI, Jodhpur)/Smt. Sangeeta Tripathi, R.O.**	2012-2017 (5 Years)	14.83
2.	Optimization of post -harvest processing for *Picrorhiza kurrooa* and *Valeriana jatamansi*. **(HFRI, Shimla)/Dr. A Rajasekaran, Sci. C**	2012-2015 (3Years)	21.40
3.	Status, survey and mapping of Ashtvargha group of medicinal and aromatic plants (MAPs) in Himachal Pradesh. **(HFRI, Shimla)/ Dr. Vaneet Jishtu, Sci. B**	2012-2017 (5 Years)	19.75
4.	Studies on the traditional knowledge of medicinal plants used by Nepali community in Assam and identification of important species for chemical analysis. **(RFRI , Jorhat)/Sh. H.N. Dhungana, R.O.**	2012-2015 (3 years)	4.99
5.	Evaluation of *Schleichera oleosa* (Kusum) fruits for their nutritional value and development of value added products for economic development of local people. **(TFRI, Jabalpur)/Dr. S. C. Biswas Sci. B,**	2012-2015 (3 Years)	5.15
6.	Standardization of non destructive harvesting practices of *Terminallia chebula* (Harra fruits) and *Soymida febrifuga* (Rohini bark & fruits). **(TFRI, Jabalpur)/Dr. Hari Om Saxena, Sci. B**	2012-2015 (3Years)	8.86
7.	Promotion of integrated livelihood support through lac and tasar cultivation in Chotanagpur plateau. **(IFP, Ranchi)/ Dr. Arvind Kumar, Sci. C**	2012-2015 (4 years)	37.764

3.1.6 Inter institutional project on Forest Protection (Nodal Institute: FRI, Dehradun)

Following projects of the ICFRE institutes were segregated and merged in this AICP on Insect pests, diseases and control (Forest Protection)

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Evaluation of some biopesticides for the management of termites in nurseries and plantations. **(FRI, Dehradun)/Dr. Shamila Kalia, Sci. E**	2012-2016 (4Years)	13.90
2.	Studies on diversity of egg parasitoid wasps *Trichogramma* spp. from Punjab and Haryana and their application in biological control of important forest insect pests. **(FRI, Dehradun)/Dr. Mohd. Yousuf, Sci. F**	2012-2016 (4 Years)	21.96
3.	Biology of hispine bamboo borer-*Estigmena chinensis* Hope (Coleoptera: Chrysomelidae) damaging green standing bamboo and its management. **(FRI, Dehradun)/Dr. K.P. Singh, Sci. C**	2012-2016 (4Years)	10.16
4.	Preliminary studies on bioactive compounds of *Mytilopsis sallei* to mitigate marine wood biodeterioration. **(IWST, Bangalore)/ Dr. M. Balaji, Sci. D**	2012-2014 (2 years)	10.834
5.	Eco-friendly management of bark eating caterpillar, *Indarbela quadrinotata* on aonla (*Emblica officinalis*) in plantations. **(TFRI, Jabalpur)/Dr. P. B. Meshram, Sci. F**	2012-2015 (3 Years)	6.57
6.	Development of rearing technique for production of insect predator, Canthecona furcellata, as biocontrol agent for larval defoliators. **(TFRI, Jabalpur)/Sh. S. Sonkar, Sci. B**	2012-2015 (3 Years)	7.52
7.	Treerich Biobooster: A Novel approach to synergise growth and pest management in fast growing industrially important tree species. **(IFGTB, Coimbatore)/Dr. S. Murugesan, Sci. F**	2012-2015 (3 years)	25.09

3.1.7 Inter institutional Coordinated Project on Wood science for processing and value added products (Nodal Institute: IWST, Bangalore)

Following projects of the ICFRE institutes were segregated and merged in this Inter institutional coordinated project on Wood science for processing and value added products.

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in Lakhs)
1.	To develop Medium Density Fiber Board (MDF) from lops and tops of poplar. **(FRI, Dehradun)/Ms. Ismita Nautiyal, Sci.B**	2012-2015 (3Years)	8.5
2	Microwave assisted chemical modification of wood. **(IWST, Bangalore)/Dr. K. K. Pandey, Sci. F** **Deferred Projects of XII RPC**	2011-2013 (2Years	8.14

3.1.8 Stand alone project (specific project)

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Determination of the treatability and durability of imported timbers as per Bureau of Indian Standards. **(IWST, Bangalore)/ Dr. R. Sundararaj, Sci.-F**	2012-2018 (6 Years)	8.80

3.2 THRUST AREA II: Biodiversity Conservation & Ecological Security

Following All India Coordinated Projects, Networking projects and Inter institutional projects to be formulated in this thrust area:-

Project 1: All India Coordinated Project on Silviculture of Indian Species (Nodal: FRI)

Project 2: Networking Project on Restoration and Reclamation on Degraded Site (Nodal: FRI)

Project 3: All India Coordinated Project on Invasive Species (Nodal: FRI)

Project 4: Networking Project on Rare and Endangered Species (Nodal: FRI)

Project 5: Networking Project on Nursery Technique (Nodal: FRI)

Project 6: Networking Project on Seed Technology (Nodal: FRI)

Project 7: All India Coordinated Project on Biodiversity and Bio-prospecting (Nodal: FRI)

Project 8: Stand alone specific project (IFGTB)

3.2.1 All India Coordinated Project on Silviculture of Indian Species (Nodal Institute: FRI, Dehradun)

Following projects of the ICFRE institutes were segregated and merged in this All India Coordinated Project on Silviculture of Indian Species:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Investigations into seed germination behaviour, storage physiology, characterization and antifungal activity of oils of some lesser known tree borne oilseeds. **(FRI, Dehradun)/Dr. Manisha Thapliyal, Sci. D**	2012-2017 (5 Years)	21.83
2.	Study of demography and natural regeneration of *Pterocarpus marsupium* and *Boswellia serrata* in Tropical dry deciduous forests of Madhya Pradesh. **(TFRI, Jabalpur)/Dr. Sanjay Singh, Sci. B**	2012-2015 (3 Years)	7.61

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
3.	Standardization of the techniques for germination, collection and maintenance of maximum viability of four important tropical species:	2012-2016 (4Years)	8.46
4.	*Bridelia retusa*, *Sterculia urens*, *Boswellia serrata and Saraca indica*. **(TFRI, Jabalpur)/Dr. M. Kundu, Sci. E**	-	-
5.	Studies on Bio-indicators of Sal Borer, *Hoplocerambyx spinicornis* Newman (Coleoptera: Cerambycidae) Population for Developing Fore- warning System. **(HFRI, Shimla)/Dr. Ranjeet Singh, Sci. E**	2012-2017 (5Years)	21.5
6.	Determination of nursery and initial plantation requirements of *Diploknema butyracea* (Roxb.) H. J. Lam and *Myrica esculenta* Buch. Ham. under mid-hill conditions of Himachal Himalayas. **(HFRI, Shimla)/ Dr. Sandeep Sharma, Sci. E**	2012-2017 (5 Years)	15.5
7.	Exploration and collection of Forest Genetic Resources and development of National Gene bank. **(IFGTB, Coimbatore)/ Dr. K. Palanisamy Sci. F**	2012-2017 (5 Years)	48.82
8.	Establishment of model plantations of teak as subsequent rotation crop for enhanced productivity **(IFGTB, Coimbatore)/Dr. A.C. Surya Prabha, Sci. C**	2012-2017 (5 years)	25.52
9.	Tree rich Biobooster: A novel approach to synergise growth and pest management in fast growing industrially important tree species. **(IFGTB, Coimbatore)/Dr. S.Murugesan, Sci. F**	2012-2015 (3 years)	25.09
10.	Development of commercially viable production system for *Aquilaria malaccensis* for promoting cultivation and management for agarwood production in humid tropics of Karnataka. **(IWST, Bangalore)/Dr. A. Srivatava, Sci. C Deferred projects of XII RPC**	2011-2016 (5 Years)	19.248
11.	Study of soil properties of different forest types to suggest suitable plant species in Nalgonda district of Andhra Pradesh. **(IWST, Bangalore)/Dr. A. Poonambalam, Sci. C Deferred projects of XII RPC**	2011-2014 (3 Years)	13.16

3.2.2 Networking Project on Restoration and Reclamation on Degraded Site (Nodal Institute: FRI, Dehradun)

Following projects of the ICFRE institutes were segregated and merged in this Networking Projects on Restoration and Reclamation on Degraded Site:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Restoration of sand stone mining area of Vindhyan Region through Microbial Technology. **(FRI, Dehradun)/Dr. Kumud Dubey, Sci. D**	2012-2017 (5 Years)	29.45
2.	Identification of the species suitable for plantation in the area around brink kilns for absorption of pollutants. **(FRI, Dehradun)/ Sh. Nirmal Ram, Sci. E**	2012-2014 (2 years)	5.24

3.2.3 All India Coordinated Project on Invasive Species (Nodal Institute: FRI, Dehradun)

Following project of the ICFRE institute is the component of this All India Coordinated Project on Invasive Species:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Impact of invasive species on plant diversity in selected forest sites of Uttarakhand, Haryana and Punjab. **(FRI, Dehradun)/ Dr. Anup Chandra, Sci. C**	2012-2015 (3 years)	8.67

3.2.4 Networking Project on Rare and Endangered Species. (Nodal Institute: FRI, Dehradun)

Following project of the ICFRE institute is the component of this Networking Project on Rare and Endangered Species:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Standardization of sampling methodology for the assessment of rare and endangered plant species in Western Ghats of Maharashtra. **(TFRI, Jabalpur)/Dr. Girish Chandra, Sci. C**	2012-2015 (3Years)	13.90

3.2.5 All India Coordinated Project on Nursery Technique. (Nodal Institute: FRI, Dehradun)

Following projects of the ICFRE institutes were segregated and merged in this Networking Project on Nursery Technique:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1	Standardization of nursery package for raising quality seedlings of Sal (*Shorea robusta*). **(TFRI, Jabalpur)/Sh. N. P. S. Nain, DCF**	2012-2015 (3 Years)	8.22
2	Biology and Management of Insect pests of seeds of *Juniperous polycarpos* C. Koch and evaluating the insect-pests resistance performance in the nursery. **(HFRI, Shimla) /Dr. Pawan Kumar, Sci. C**	2012-2015 (3 Years)	7.5
3	Development of germination and nursery practices for raising quality seedlings of selected important forest tree species of arid and semi arid areas *(Anogeissus pendula, Boswellia serrata* and *Commiphora wightii)*. **(AFRI, Jodhpur)/Dr. N. K. Bohra Deferred project of XII RPC**	2012-2017 (5 Years)	17.66

3.2.6 Networking Project on Seed Technology (Nodal Institute: FRI, Dehradun)

Following project of the ICFRE institutes were segregated and merged in this Networking Project on Seed Technology:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1	Studies on ecophysiology of seed germination, seedling emergence and survival of *Ougenia oojeinensis* and *Adina cordifolia*. **(TFRI, Jabalpur)/ Dr. M. Kundu Sci. E**	2012-2015 (3 Years)	9.17
2	Studies on flowering and seed ontogeny of *Buchanania lanzan* Roxb. **(TFRI, Jabalpur)/Dr. M. Kundu Sci. E**	2012-2016 (4 Years)	13.54
3	Biology and Management of Insect pests of seeds of *Juniperous polycarpos* C. Koch and evaluating the insect-pests resistance performance in the nursery. **(HFRI, Shimla) /Dr. Pawan Kumar, Sci. C**	2012-2015 (3 Years)	7.5

3.2.7 All India Coordinated Project on Biodiversity and Bio-prospecting (Nodal Institute: FRI, Dehradun)

Following projects of the ICFRE institutes were segregated and merged in this All India Coordinated Project on Biodiversity and Bio-prospecting:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Ecology, utilization and conservation of *Garcinia* species in Upper Brahmaputra Valley, Assam. **(RFRI, Jorhat)/Dr. D. Dutta, R.O.**	2012-2015 (3 years)	17.85
2.	Genetic diversity of *Trichoderma* strains prevalent in forest types of North East India. **(RFRI, Jorhat)/Dr. Shailesh Pandey, Sci. B**	2012-2015 (3 years)	27.21
3.	Survey, evaluation and management of important insect-pests and diseases of *Anogeissus pendula* **(AFRI, Jodhpur)/Dr. Shiwani Bhatnagar, Sci. B**	2012-2015 (3 Years)	23.86
4.	Habitat association, distribution pattern and molecular characterisation (DNA Bar coding and RAPD-PCR) of butterflies (Lepidoptera) in the Western Himalayan Sub-Alpine Forests of Himachal Pradesh. **(HFRI, Shimla)/Dr. Pawan Kumar, Sci. C**	2012-2015 (3 Years)	12.25
5.	Documentation of biodiversity of forest fungi of Madhya Pradesh. **(TFRI, Jabalpur)/Dr. R. K. Verma Sci. E**	2012-2015 (3 Years)	8.6
6.	Phytochemical evaluation, development of nursery practices and conservation of germplasm of *Withania coagulens* (Stocks) Dunal, an endemic and endangered plant species of Thar desert. **(AFRI, Jodhpur)/Dr. Mala Rathore, Sci. D Deferred Project of XII RPC**	2011-2015 (4 Years)	19.834

3.2.8 Stand alone specific project

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1	Gene-ecological variation in teak populations of Kerala and Tamil Nadu. **(IFGTB, Coimbatore)/Dr. R. Yasodha, Sci. E**	2012-2017 (5 years)	41.68

3.3 THRUST AREA III: Forest & Climate Change

Following programs to be taken up in this thrust area:-

Program 1: Impact Component

Program 2: Adaptation Component

Program 3: REDD+ and Mitigation Component

3.3.1 Program 1: Impact Component

A detailed AICP on Forest and Climate Change has been formulated under this Thrust Area by Sh. M.P. Singh, NPD **(Enclosure 8)**. Following projects of the ICFRE institutes were segregated and merged in this component. These projects initially will be taken on pilot basis at FRI, Dehradun.

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1	Climate change impact study on insect diversity, abundance and migration. **(FRI, Dehradun)/Dr. M. Yousuf, Sci. F**	10 years	178.10
2	Studies on the impact of elevated CO_2, and temperature on secondary chemical constituents of selected medicinal and aromatic plants of north-western Himalayan region. **(FRI, Dehradun)/ Dr. Y.C. Tripathi, Sci. E**	10 years	259.99
3	To study composition and dynamics of fungal species vis-à-vis climate change and identification of first indicators of climate change. **(FRI, Dehradun)/Dr. N.S.K. Harsh, Sci. F**	10 years	310
4	Impact of climate change on phenology of major tree species in different forest types of Uttarakhand. **(FRI, Dehradun)/ Dr. Subhash Nautiyal, Sci. F**	5 years	225.90
5	Studies on seed mass, seed quality, regeneration and litter flammability. **(FRI, Dehradun)/Head, Silviculture Division**	5 years	84.78
6	Relationship between forest fire and climate change. **(FRI, Dehradun)/Dr. S.D. Sharma, Sci. E**	6 years	265.83
7	To assess the impact of climate change on structure and composition, pattern of litter fall and litter decomposition along with various biomass parameters of Preservation Plots (PPs) of Uttarakhand. **(FRI, Dehradun)/Dr. Laxmi Rawat, Sci. F**	10 years	308.95
8	Studies to analyze the interaction between vegetation and environment due to climate change with emphasis on bio geo-chemical properties of soil. **(FRI, Dehradun)/Dr. A.K. Raina, Sci. F**	10 years	249.78
9	Elucidating the response of climate change on genetic diversity and species richness of selected forestry species in natural ecosystem. **(FRI, Dehradun)/Dr. H. S. Ginwal, Sci. F**	10 years	28.754
10	Predicting impact of climate change on Himalayan forests using vegetation modelling. **(FRI, Dehradun)/Sh. M.P. Singh, Head, CCFI**	4 years	33.22
11	Reassigning Forest Type of India for better management of Forests in India. **(ICFRE Hq., Dehradun)/Dr. V.K. Bahuguna, DG, ICFRE**	2012-13 (1 Year)	50.01

Following projects of ICFRE institutes will also be the part of this component.

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1	Study of forest influence on hydrological behavior of watersheds in Garhwal Himalayas. **(FRI, Dehradun)/Sh. Manoj Kumar, R.O.**	2012-2017 (5 Years)	50.0
2	Dendro-chronological studies in relation to growth pattern of important conifer species of Western Himalayas. **(FRI, Dehradun)/Dr. P.K. Pande, Sci. E**	2012-2017 (5 years)	29.2
3	Assessment of diversity and carbon sequestration potential of Tree Outside Forests in Upper Brahmaputra Valley of Assam using Remote Sensing and GIS. **(RFRI, Jorhat)/Dr. Ranjeet Kumar, Sci. C**	2012-2015 (3 Years)	16.08
4	Determination of optimum rotation age of tree species on the basis of carbon sequestration in central India. **(TFRI, Jabalpur)/Dr. A. K. Bhowmik, Sci. C**	2012-2016 (4 Years)	15.09
5	Assessment of soil carbon stock in the forests of Madhya Pradesh. **(TFRI, Jabalpur)/Dr. A. K. Bhowmik, Sci. C**	2012-2016 (4 Years)	13.99
6	Carbon sequestration potential of existing land use system in Lahual valley, HP. **(HFRI, Shimla)/Dr. K.S. Kapoor, Sci. F**	2012-2017 (5 Years)	27.4
7	Assessment of soil organic carbon under different land uses in Tamil Nadu **(IFGTB, Coimbatore)/Dr. A.C. Surya Prabha, Sci. C**	2012-2015 (3 years)	33.9
8	One on mangrove species measure of sedimentation. **(FRI, Dehradun)**	-	-
9	Climate Change Modelling **(FRI, Dehradun)**	-	-
10	Soil carbon sequestration in a traditional agroforestry system in Karnataka. (**IWST, Bangalore)/Dr. S. Viswanath, Sci. F** **Deferred Projects of XII RPC**	2011-2014 (3 Years)	41.23

3.3.2 Revision of Forest Types of India

All Institutes of ICFRE to be involved in studying the change matrix of Forest Types of India. The prime objective of revising Forest type of India is (i) to understand the impact of climate change on forest vegetation (ii) to devise a forest classification from management perspective (iii) to develop a forest classification system in line of international organizations like FAO for better understanding of Indian forest perspectives in the international forums and (iv) to prepare a change matrix of forest types of India.

3.4 THRUST AREA IV: Forest Genetic Resource Management and Tree Improvement

Following All India Coordinated programs will be taken up in this thrust area (**Enclosure 9**)

Program 1: Tree improvement and breeding for improved productivity and adaptability

Program 2: Forest Genetic Resource Evaluation and Conservation

Program 3: Applied Genomic Research and genetic engineering for desirable

3.4.1 Program 1: Tree improvement and breeding for improved productivity & adaptability

3.4.1.1 All India Coordinated Project on Eucalyptus (Nodal Institute: IFGTB Coimbatore)

Following projects of the ICFRE institutes were segregated and merged in this All India Coordinated Project on Eucalyptus:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Establishment of second generation seed orchards and selection of clones for high productivity in *Eucalyptus*. **(IFGTB, Coimbatore)/ Dr.V. Sivakumar, Sci. D**	2012-2017 (5 Years)	39.98
2.	Genetic diversity assessment for management of Eucalyptus seed orchards. **(IFGTB, Coimbatore)/Dr. Rekha R.Warrier, Sci. D**	2012-2017 (5 Years)	47.60
3.	Incorporating resistance in *Eucalyptus* to *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae) through expression of insect specific dsRNA. **(IFGTB, Coimbatore)/Dr. N.V. Mathish, Sci. D**	2012-2016 (4Years)	29.75

3.4.1.2 All India Coordinated Project on Teak (Nodal Institute: TFRI, Jabalpur)

Following project of the ICFRE institutes were segregated and merged in this All India Coordinated Project on Teak:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Gene-ecological variation in teak populations of Kerala and Tamilnadu. **(IFGTB, Coimbatore)/Dr. R.Yasodha, Sci. F**	2012-2017 (5 Years)	41.68
2.	Developing breeding population of teak with broad genetic base for long term genetic improvement. **(IFGTB, Coimbatore)/Dr. B. Gurudev Singh, Sci.**	2012-2015 (3 Years)	11.97

3.4.1.3 All India Coordinated Project on Bamboo (Nodal Institute: RFRI, Jorhat)

Following projects of the ICFRE institutes were segregated and merged in this All India Coordinated Project on Bamboo**:-**

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Stability analysis of Candidate Plus Clumps (CPCs) of Bamboos and Identification of CPCs Specific SSR Markers. **(RFRI, Jorhat)/Sh. Mohd Ibrahim, Sci. B**	2012-2015 (3 Years)	-
2.	Infraspecific variations in carbon assimilation and morphological traits of *Dendrocalamus strictus* (Roxb.) Nees clones. **(FRI, Dehradun)/Dr. Meena Bakshi, Sci. D**	2012-2015 (3 Years)	35.62
3.	Productivity studies on commonly cultivated bamboo species in different agro climatic zones of Tamil Nadu. **(IFGTB, Coimbatore)/Sh. Maria Dominic Savi, Sci. D**	2012-2017 (5 Years)	19.11
4.	Genetic variability assessment of *Dendrocalamus longispathus* (Kurz) in Mizoram and Tripura. **(RFRI, Jorhat)/Sh. R.K. Meena**	2012-2015 (3 Years)	-

3.4.1.4 All India Coordinated Project on *Melia composita* (Nodal Institute: FRI, Dehradun)

Following project of the ICFRE institutes were segregated and merged in this All India Coordinated Project on *Melia composita* (Syn. *M. Dubia*):-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Genetic screening of productive and adaptive progenies in *Melia composita* Willd. **(FRI Dehradun)/Dr. Ashok Kumar**	2012-2015 (3 Years)	22.95
2.	Collection, Conservation and Evaluation of *Melia dubia* Germplasm of North-Eastern India. **(RFRI, Jorhat) /Sh. Aditya Kumar**	2012-2015 (3 Years)	16.99

3.4.1.5 All India Coordinated Project for improvement of fast growing phyllodinous Acacias (Nodal Institute: IFGTB, Coimbatore)

3.4.1.6 All India Coordinated Project on fast growing native tree species (Nodal Institute: IFGTB, Coimbatore)

3.4.1.7 Inter-institutional Project on *Acacia nilotica* (Nodal Institute: FRI, Dehradun)

Following projects of the ICFRE institutes were segregated and merged in this Inter-institutional Projects on *Acacia nilotica*:-

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Selection and screening of germplasm of *Acacia nilotica* L. to improve Productivity in Tamil Nadu. **(IFGTB, Coimbatore)/Dr. K. Panneer Selvam, Sci. C**	2012-2017 (5 Years)	38.97
2	Genetic improvement of *Acacia nilotica* through selection and evaluation of germplasm in northern India. **(FRI, Dehradun)/Dr. Rama Kant, Sci. B**	2012-2016 (4 Years)	19.36

3.4.1.8 Inter-institutional Project on *Dalbergia latifolia* (Nodal Institute: IWST, Bangalore)

Following project of the ICFRE institute is the component of this Inter-institutional Projects on *Dalbergia latifolia*.

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Selection and genetic evaluation of *Dalbergia latifolia* germplasm in north India. **(FRI, Dehradun)/Dr. M.S. Bhandari, Sci. B**	2012-2016 (4 Years)	16.86

3.4.1.9 Regional Projects on *Dalbergia sissoo* Roxb. (FRI), *Leucaena leucocephala* (IFGTB), *Gmelina arborea* (RFRI), *Tecomella undulata* (AFRI)

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Genetic diversity and adaptability through morphological and molecular markers in *Dalbergia sissoo* Roxb. **(FRI, Dehradun) /Dr. Ashok Kumar, Sci. E**	2012-2015 (3 Years)	39.51
2.	Germplasm assemblage and Improvement of *Leucaena leucocephala* (Lam.) de Wit for industrial biomass productivity. **(IFGTB, Coimbatore)/Durai, R.O.**	2012-2017 (5 Years)	23.31
3.	Screening of *Gmelina arborea* Roxb. clones for productivity and stability. **(RFRI, Jorhat)/ Tara Chand, Sci. C**	2012-2017 (5 Years)	31.98
4.	Assessment of variability, improvement and refinement of cloning techniques of *Tecomella undulata*. **(AFRI, Jodhpur)/Ms. Desha Meena**	2012-2017 (5 Years)	59.00

3.4.2 Program 2: Forest Genetic Resource Evaluation and Conservation

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	Exploration and Collection of Forest Genetic Resources and Development of National Gene Bank. **(IFGTB, Coimbatore)/Dr. K. Palanisamy, Sci. F**	2012-2017 (5 Years)	48.82
2.	Collection of germplasm of *Madhuca indica* J. F. Gmel for identification of best sources in Chhattisgarh through phytochemical evaluation. **(TFRI, Jabalpur)/Dr. Fatima Shirin, Sci. E**	2012-2015 (3 Years)	11.04
3.	Standardization of vegetative propagation techniques for *Shorea robusta* Garetn. **(TFRI, Jabalpur)/Dr. Yogeshwar Mishra, Sci. E**	2012-2016 (4Years)	17.44
4.	Genetic Diversity Analysis of Blue pine (*Pinus wallichiana*) through DNA markers. **(FRI, Dehradun)/Dr. H. S. Ginwal, Sci. F**	2012-2015 (3Years)	24.45
5.	Tree Borne Oil seeds (TBOs) in community lands for Improved Livelihoods of Vulnerable Groups of Jharkhand. **(IFP, Ranchi)/Dr. B.N. Divakara, Sci. C**	2012-2017 (5 Years)	48.30
6.	Study on chromosomal aberrations and phenotypic abnormalities in trees growing in polluted areas around sponge iron factories for determination of mitigation strategies of pollution effect. **(TFRI, Jabalpur)/Dr. Rupnarayan Sett, Sci. D**	2012-2015 (3Years)	12.96
7.	Cytogenetic analysis in important native tree species. **(IFGTB, Coimbatore)/Dr. R. Yasodha, Sci. E**	2012-2015 (3 Years)	11.72
8.	Mapping and monitoring of *Casuarina* and *Eucalyptus* plantations in Tamilnadu using RS and GIS techniques. **(IFGTB, Coimbatore)/ Sh. R. Vivekanandan, Sci. E**	2012-2015 (3 Years)	17.00

3.4.3 Program 3: Applied Genomic Research and genetic engineering for desirable traits

Sr. N.	Title of the Project / Institute / PI	Duration	Budget (Rs in lakhs)
1.	*Incorporating resistance in Eucalyptus to *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae) through expression of insect specific dsRNA. **(IFGTB, Coimbatore)/Dr. N.V. Mathish, Sci. D**	2012-2016 (4Years)	29.75
2.	Screening tree species for their potential to accumulate metals and to produce nanoparticles under in vivo and in vitro conditions. **(AFRI, Jodhpur)/Dr. U.K. Tomar, Sci. E**	2012-2016 (4 Years)	60.70

*This will also be part of AICP on Eucalyptus

3.5 Thrust Area V: Forestry Education and Policy Research to Meet Emerging Challenges

All India Coordinated project on NTFPs quantification and evaluation including 5 to 6 important NTFPs with agriculture Universities and other Universities of the country and NTFP Division of FRI, Dehradun to be formulated in the first phase

3.6 Thrust Area VI: Forestry Extension for Taking Research to the People

Following projects were segregated under this Thrust area:-

Sr. N.	Title of the Project/Institute/PI	Duration	Budget (Rs in lakhs)
1.	Support to Women Self Help Groups in Mushroom cultivation for Income Generation. **(FRI, Dehradun)/Sh. S. Chandra, R.O.**	2012-2014 (2 Years)	4.80
2	Documentation of traditional knowledge of protecting marine wooden craft through indigenous methods. **(IWST, Bangalore)/Sh. M.V. Rao, Sci. C**	2012-2014 (2 Years)	2.945
3.	Documentation of neem products and their role in socio-economic upliftment of rural livelihood in Rajasthan and Gujarat. **(AFRI, Jodhpur)/ Smt. S. Tripathi, R.O.**	2012-2017 (5 Years)	21.47
4.	Documentation of neem products and their role in socio-economic upliftment of rural livelihood in Rajasthan and Gujarat. **(AFRI, Jodhpur)/Smt. S. Tripathi, R.O.**	2012-2017 (5 Years)	21.47
5.	Documentation of biodiversity of forest fungi of Madhya Pradesh. **(TFRI, Jabalpur)/Dr. R.K. Verma, Sci. E**	2012-2015 (3 Years)	8.60
6.	Preparation of a user-friendly data-base of phytodiversity in satpura Plateau Agroclimatic zone of Madhya Pradesh. **(TFRI, Jabalpur)/Dr. Sanjay Singh, Sci. B**	2012-2015 (3 Years)	7.56

The basic frame work formed after segregation/merging of the projects as reflected above in the thrust areas was circulated to all the NPDs/Directors of the institutes/ nodal officers from the institutes as minutes of first meeting of the XIII RPC held on 14th-16th February 2012. It was only to facilitate NPDs to form projects proposals. On the basis of this tentative grouping NPDs/Nodal officers including Directors were to draft the revised proposals.

Subsequently 1st follow up meeting was chaired by DG, ICFRE through video conferencing on 1st March, 2012 with the NPDs, Directorate of Research, Directors of the Institutes, Nodal Officers. 2nd and 3rd follow up meeting on 4th April, 2012 and 14th April, 2012 was chaired by DDG(R) to Coordinate and review the progress of the formulation of All India Coordinated Projects/Net working and Inter Institutional Projects on these Thrust areas.

Research Planning Division was providing continuous support to NPDs, Nodal officers in shaping and formulating these projects/Programs. The redrafted projects/programs were submitted by NPDs to Research Planning Division, Directorate of Research. Before organising the second meeting of XIII RPC, consultative meetings were held with NPDs under the Chairmanship of DDG(R). In view of the budget constraints the prioritisation of the components of each project/program was worked out along with the budget appropriation. The final outcome of these meetings was presented in the second meeting of XIII RPC held on 11th May 2012 through video conferencing under the Chairmanship of DG, ICFRE. NPDs presented the programs to the RPC in respective thrust area along with total budget outlay along with the requirement of the year 2012-2013, which is detailed in Chapter 4.

4 Decision of XIII RPC (Part II): Final Approval

The second meeting of XIII RPC was convened on 11th May, 2012 at ICFRE HQ Board Room under the chairmanship of Dr. V. K. Bahuguna, DG, ICFRE. All the DDGs, all National Project Directors, ADGs, Scientist F from ICFRE HQ attended the meeting. All the Directors, Group Coordinators, Nodal Officers and scientists participated through Video Conferencing. Director and Group Coordinator (Research) of FRI, Dehradun were present at ICFRE HQ.

At the outset Shri Sandeep Tripathi, DDG (Research) welcomed the chairman Dr. V. K. Bahuguna, DG, ICFRE and all the participants. He briefed the house about status of ongoing projects of the institutes and allotment of the budget for 2012-13, already communicated to the institutes. He also informed the house about the manpower engaged as JRF/SRF/PA/FA against the number of ongoing internal research projects of the institutes, which reflect that in some of the institutes the ratio of research projects and manpower is very high. The house was appraised about the detailed analysis, segregation and grouping of projects after series of video conferencing meetings with Directors, NPDs and Scientists. Details of new projects in the form of All India Coordinated Projects/Net working and Inter Institutional Projects based on Thrust areas along with prioritized budget based on fund availability was also briefed by him.

Dr. V. K. Bahuguna, DG, ICFRE in his opening remarks informed the house that budget for this year has been severely curtailed so the research priorities and research programmes have been linked appropriately making output of one scientist as input of other within the available budget and resources for its maximum delivery. DG, ICFRE informed the house that more allotment is expected by July, 2012 and additional prioritized research programmes/projects would be added as and when the money is received. He emphasized the need of optimal and judicious utilization of manpower engaged in the projects. Citing the reference of analysis made by Research Planning Division, he indicated that AFRI, TFRI, IFGTB and RFRI are having about one JRF/SRF per two projects, which should be normally one JRF/SRF for four projects. He advised the Directors to suitably correct this anomaly by removing extra JRFs/SRFs as the scientists have to be encouraged to work by themselves rather depending on JRF/SRFs. DG ICFRE expressed his appreciation for the inputs made by Directorate of Research and NPDs.

After this, Thrust area wise presentation was made by the respective National Project Directors (NPDs).

4.1 Thrust Area I: Managing Forest and Forest Products for Livelihood Support and Economic Growth

National Project Director, Ms Neelu Gera, presented the programmes under this Thrust Area. A total of **7** programmes with **57** components with total budget outlay of **Rs 813.51** lakhs under this thrust area were presented. Budget requirement for this year was **Rs. 289.12 lakhs.** All the components were appreciated by DG, ICFRE, however, due to budget constraint, only **33** prioritized components were approved to be started in 2012-13. The remaining components are to be taken up subsequently depending on the budget availability. Thus under Thrust Area **1, 33** components with budget of **Rs 75 lakhs** for 2012-13 were approved. The details of the Seven Programmes along with prioritized budget summary and details of Institutes are given in subsequent sections.

4.2 Thrust Area II: Biodiversity Conservation and Ecological Security

National Project Director, Dr. Veena Chandra, presented the programmes under this Thrust Area. A total of **7** programmes having **22** components with total budget outlay of **Rs 1843.14 lakhs** under this Thrust Area were presented. All the components were appreciated by DG, ICFRE, however, due to budget constraint only **9** prioritized components were approved to be started in 2012-13. The remaining components are to be taken subsequently depending on the budget availability. A new project on Rare and Endangered species of Himachal Pradesh, Sikkim, Arunachal Pradesh, and Manas in Assam was decided to be formulated. Another Networking project on Bio Prospecting along with ICMR was decided to be formulated. Thus under Thrust Area **II, 9** components with budget of **Rs 33.00 lakhs** for 2012-13 were approved. The details of the seven Programmes along with prioritized budget summary and details of Institutes are given in subsequent sections.

4.3 THRUST AREA III: Forest and Climate Change

National Project Director, Shri M.P. Singh presented the programme under this thrust area. The NPD has formulated a comprehensive long term AICP (at least of ten years) on "Coordinated Climate Change Forestry Research Program" having Impact, Adaptation and Mitigation programs and 18 components with a total budget outlays of **Rs 125 crore**. In addition to this one programme on Forest Types and two additional components were added. Thus a total of **4** programmes including reassignment Forest Type studies (3+1) with **21** subcomponents with total budget of Rs**. 235 lakhs** for the current year were presented. Only **3** sub components of Impact program with budget of **Rs. 35 lakhs** for 2012-2013 under which Pilot studies will be carried out by FRI, Dehradun to finalize the methodologies for its' up scaling and replication in other institutes later. Subsequent projects will be developed after the finalization of methodologies from the outcome of the pilot projects. **Rs. 101 lakhs** was approved for the reassignment of Forest Types of India Project. Thus an amount of **Rs. 136 lakhs** was approved for this programme.

THRUST AREA IV: Forest Genetic Resources Management and Tree Improvement

National Project Director, Dr H.S. Ginwal presented the **3** programmes under this thrust area. A total of **129** components with budget of **Rs. 505.40 lakhs** was presented under this thrust area. For the current year, **Rs. 80 lakhs** were approved to take up **7** components. Remaining components are to be taken up subsequently depending upon the budget availability. The details of the **3** programmes along with the prioritized budget summary and details of institutes are given in subsequent sections.

THRUST AREA V: Forestry Education and Policy Research To Meet Emerging Challenges

National Project Director, Shri R.K. Dogra presented the programme. DG observed that this needs to be reformulated. DG, ICFRE desired that a long term programme with detailed modalities for its execution under this thrust area may be formulated by June 2012 integrating Forestry Universities in ICFRE research systems. The same may be compiled and submitted by June 2012. This will be reflected in the ICFRE vision document.

As desired earlier by DG, ICFRE Shri R.K. Dogra, NPD would also formulate an All India Coordinated project on NTFPs quantification and evaluation including 5 to 6 important NTFPs with agriculture universities and other universities of the country and NTFP Division of FRI, Dehradun in the first phase.

THRUST AREA VI: Forestry Extension for taking Research to People

National Project Director, Shri R.P. Singh presented the programme under this thrust area with budget outlay of **Rs. 8.45 lakhs** with **3** components. DG, ICFRE desired that this programme may be reformulated by the NPD. The New programme may include some good completed research projects of last three years with scope of extension of these results for the stakeholders/end users like SFDs, Industries, common man and advised to add Direct to Consumers involving Gram Sabah and Gram Panchayat also in the programme. He desired that same may be submitted by 30th June 2012.

Ongoing projects: The budget requirement for the ongoing projects for the year 2012-2013 was Rs. 878.946 lakhs. However due to budget constraints **Rs. 293 lakhs (2.93 crore)** was approved for ongoing projects for 2012-13. RPC authorized the Directors of the institutes to use this budget for the ongoing projects along with the projects which needs extension with in this amount and would be reviewed in July 2012. Table below gives Institute wise budget break up for the ongoing projects.

Table 4.1: Budget approved for ongoing projects for 2012-13

Institute	Budget to be Released (Rs. in lakhs)
Arid Forest Research Institute, Jodhpur	25
Himalayan Forest Research Institute, Shimla	14
Institute of Forest Genetics & Tree Breeding, Coimbatore	50
Tropical Forest Research Institute, Jabalpur	20
Institute of Wood Science & Technology, Bangalore	30
FRC, Hyderabad	9
Institute of Forest Productivity, Ranchi	20
Forest Research Institute, Dehradun	100
CSFER, Allahabad	-
Rain Forest Research Institute, Jorhat (from NE fund)	25
TOTAL	**293**

A total budget of **308 lakhs (3.08 crore)** was approved by RPC for the year 2012-13 for the New Projects/Programmes. **Rs. 75 lakhs** was approved by RPC for the year 2012-13 for Thrust Area I, **Rs. 33 lakhs** for Thrust area II, **Rs. 120 lakhs** for Thrust Area III (including **Rs. 85 lakhs** for Forest Type Project) and **Rs. 80 lakhs** for Thrust Area IV for 2012-13.

Subsequently Shri Sandeep Tripathi, DDG (Research) held Video Conferencing on 1st June, 2012 with the Directors and nodal officers of the ICFRE Institutes) regarding Forest Type studies. The additional allotment to FRI, Dehra Dun (Rs. 5.00 lakh) and to RFRI, Jorhat (Rs. 11.00 lakh) on their request was approved by DG ICFRE.

Thus the revised budget for new projects for 2012-13 is **Rs. 324.00 (Rs. Three crore and twenty four lakhs only**). The institute wise and Thrust Area wise detail of revised budget is given in Table 4.2 and 4.3

Table 4.2: Institutes wise break up of budget for 2012-2013

Sl. No.	Institute	Budget (Rs. in lakhs)
1.	FRI, Dehradun	102.73
2.	HFRI, Shimla	22.00
3.	AFRI, Jodhpur	23.89
4.	IWST, Banglore	30.873
	(FRC, Hyderabad)	4.06
5.	IFGTB, coimbatore	51.39
6.	RFRI, Jorhat	28.476
7.	IFP, Ranchi	10.889
8.	TFRI, Jabalpur	36.14
9.	ICFRE, Dehradun	13.552
	TOTAL	**324.00**

Table 4.3: Thrust Area wise break up of budget for 2012-2013

Thrust Area	Budget (Rs. in lakhs)
I Managing Forest and Forest Products for Livelihood support and Economic Growth	75.00
II Biodiversity Conservation and Ecological Security	33.00
III a Climate Change	35.00
III b Forests Type	101.00
IV Forests Genetic Resources Management and Tree Improvement	80.00
TOTAL	**324.00**

The total budget of **Rs.617.00 lakhs (Rs. 6.17 crore)** for 2012-13 for new projects (**Rs.324.00 lakhs**) and for ongoing projects (**Rs.293.00 lakhs**).

DG, desired that allotted amounts for the ongoing and new projects be expeditiously and judiciously utilized to complete the extended projects and the Forest Type Project at the earliest and make substantial progress in New Projects by July 2012.

Institute wise budget summary of all Thrust Areas for new projects for the year 2012-13 is given in Table 4.4 below.

Table 4.4: Institute wise budget of Research Thrust Areas for new projects for the year 2012-13

Trust Areas	FRI	HFRI	AFRI	IWST	FRC	IFGTB	RFRI	IFP	TFRI	ICFRE	TOTAL
Thrust Area I	33.54	2.00	6.73	14.8	-	2.28	3.34	2.18	10.11	-	75
Thrust Area II	10.00	8.00	4.00	-	-	5.00	3.00	-	3.00	-	33
Thrust Area III a (Climate Change)	35.00	-	-	-	-	-	-	-	-	-	35
Thrust Area III b (Forest Types)	15.00	12.00	6.60	11.363	-	13.00	17.446	6.209	5.83	13.552	101
Thrust Area IV	9.19	-	6.56	4.69	4.06	31.11	4.69	2.50	17.20	-	80
TOTAL (Rs. in lakhs)	**102.73**	**22.0**	**23.89**	**30.873**	**4.06**	**51.39**	**28.476**	**10.889**	**36.14**	**13.552**	**324**

Thrust area wise details of priortized components of the programmes for the year 2012-2013 are given in the subsequent pages of this chapter alongwith other details under each thrust area.

Thrust Area I : Managing Forest and Forest Products For Livelihood Support and Economic Growth

The Natural Resources are vital for food, economic and ecological security of the nation. The sustainable use of these Natural Resources including forests is, therefore, not an option, but an imperative full of challenges. Integration of environmental issues with development strategies is the need of the hour, not only for poverty alleviation, but also for economic growth. The Millennium Development Goals of India envisage reducing poverty by half by the year 2015 as well as ensuring environmental stability. The forest resources can provide opportunities not only for subsistence, but also for livelihood improvement through improved economy and increased assets and rights of the people. The sustainable management of forests and natural resources not only aims to protect and conserve the resources but is also linked to the economic well being of the people and the country.

More than 25% of the world's population, are estimated to rely on forest resources for their livelihoods and most of them use trees on farms to generate food and cash. Moreover, many countries in the developing world depend on fuelwood, primarily drawn from forests, to meet as much as 90% of energy requirements. For millions of people living in poverty, forest and tree resources not only provide food, fuel for cooking and heating, medicine, shelter and clothing, but also function as safety nets in times of scarcity. Forests resources also generate income through employment and through the sale of surplus goods and services. Despite the importance of these resources for the range of economic, environmental, social and cultural benefits they provide, data on such dimensions are either sketchy or not available. Therefore, the extent to which they contribute to national development, reduce poverty and enhance food security for vulnerable populations is not well recognized, appreciated or documented.

The sheer variety of products, goods & services that are available from the forest is tremendous. These include timber/wood based products like timber, small wood, biomass for energy for sawn lumber, plywood, chipboard, veneer, furniture, flooring, shingles, wood chips, specialist veneers, chopsticks, carved items, fuel wood, lac, honey tussar, charcoal, briquettes, non timber forest products like fruits, nuts, seeds, bark and roots, exudates, fibers, bamboo, rattan, mushrooms, wildlife for leaf plates, foods, bidis, medicines, floral displays, mats, paper, string, rope, garments other woven items, foods, medicines, oils, tannins, cork, latex, gums, resins and services like recreational services, watershed services, religious-cultural services, for ecotourism, ground water recharge, increased water flow in rivers, drinking water and scared groves.

Maximizing Livelihood opportunities

- **Sustainable use of land: -** The development of local forest based enterprises like lac, honey tussar represents an opportunity for strengthening the livelihoods of poor, forest-dependent people, at the same time providing an economic incentive to conserve forests through sustainable management.

- **Evergreen revolution: -** The country today has no option except to produce more from the available land & water resources without compromising on the ecological & environmental well being. Now most of demand for wood and other wood based products is being met from the trees outside forests (TOF), while the other forests products like medicinal plants need to be incorporated into the farming systems for better productivity & utilization as well as conservation of resources. Integration of tree, shrub & grass components into the agricultural landscape helps in better utilization of the resources is spatial & temporal framework. Extensive development of agroforestry systems especially in arid, semiarid, hill areas and waste lands need to be developed.

- **Development of appropriate technologies:-** Development of appropriate and adoptable technologies is the most essential part of the research and development technologies/ programmes. Unless the research translates to implementation in the field and reaches the target group, the efforts in terms of financial and manpower resources go waste.

- **Demand supply of Forest Products:-** There is a huge gap in supply of Forest Products from the forests. The fuelwood & fodder from the forests & plantations is estimated to be extracted much in excess of what they are capable of producing on a sustained basis. The gap between demand & supply needs to bridge to prevent ecological disasters.

- **Market information & infrastructure:-** In India, the market mechanisms, have not fully developed for forest products. In the past the timber was produced only from Government owned forests, so a free market infrastructure could not develop. With people taking up plantations on private lands, and imports liberalized, markets have started evolving. But market mechanisms need to be strengthened through research and infrastructure development.

- **Policy & legal issues in forestry: -** Research in policy and legal issues in forestry often takes a backstage. There is a strong need to undertake studies on legislations and procedures in respect of the felling, timber transport and processing, export and import policies of forest and forest based products, besides economic security and incentives for tree growers.

- **Extension, training and capacity building:-** A technology that does not reach the user signifies the failure of the delivery systems. With available technologies in a number of fields such as wood technology and agroforestry, the extension mechanism and training of stakeholders is most essentials. Besides, capacity building of personnel involved in research and development in forestry also needs to be augmented-.

In view of the important role of forestry in livelihood support and economic growth of the people of the country, an ambitious programme is being envisaged with emphasis on programmes including Agroforestry, Chemistry of Forest products for Value Addition, Utilization of Forest Invasive Species, Wood Science and Technology, Valuation of Forest Ecosystems, Wild Fruits, Sustainable management of Fringe Forests, Microbes in service of mankind, Tree Resource Management for livelihoods and economic growth with particular reference to species including Bamboo, Rattans, *Buchanania lanzan, Madhuca latifolia,* Juniperus, Hippophae, *Melia composita,* besides other target specific programmes. Also programmes will be developed on tussar, lac and honey by the concerned institutes. However in the current year, following programmes are envisaged:

- Agroforestry
- Insect pests & diseases of forest tree species and their control measures
- Non-timber Forest Resource: Value Addition for Livelihood Generation
- Bamboo for Resource Management, Value Addition and Skill Development
- Utilization Potential of Timber from *Melia composita* syn *Melia dubia*
- Chemistry of Forest Products for Value Addition
- Wood Science and Technology for Livelihood and Economic Growth

Status of Approved Programs / components at a glance for THRUST AREA - I

Programme	Component	Total Budget	Current year (2012-13) Requirement	Prioritized components	Prioritized budget requirement	Approved budget for 2012-13	Institutes	Remarks
Agroforestry	5	146.76	28.32	4	22.04	15.00	AFRI-2, TFRI-1, FRI-1	1 component from HFRI to be covered under Climate Change programme
Insect pests & diseases of forest tree species and their control measures	8	108.514	43.426	5	23.67	14.00	FRI-2, IWST-1, TFRI-2	1 component on Bio-boosters (IFGTB) for external funding (DBT). 2 components (AFRI-1, FRI-1)-pending
Non-timber Forest Resource :Value Addition for Livelihood Generation	7	101.3	30.21	3	5.76	4.5	TFRI-1, AFRI-1	1 component (IFP) (external funding) 2 components(HFRI-1, RFRI-1) pending
Bamboo for Resource Management,Value Addition and Skill Development	10	191.21	70.38	4	17.75	10.00	IFGTB-1, IWST-2, RFRI-1	2 components (RFRI) to be covered under Genetics programme 1 component RFRI - (external funding). 3 components (AFRI-1, FRI-2)-pending
Utilization Potential of Timber from *Melia composite syn Melia dubia*	13	143.31	66.44	9	23.02	15.00	IWST-3, FRI-6	4 component s (IWST-4)-pending. 2 components (FRI-1, IWST-1) can be combined making the total prioritize components to 8
Chemistry of Forest Products for Value Addition	10	96.49	38.54	6	18.62	9.00	FRI-3, TFRI-1, IWST-1	4 components (FRI-2, IFP-1, TFRI-1)-pending
Wood Science and Technology for Livelihood and Economic Growth	4	25.93	11.80	3	10.13	7.5	IWST-1	FRI-2, 1 component (IWST-1) -pending
TOTAL	**57**	**813.514**	**289.116**	**33**	**120.99**	**75.00**	**FRI-14,TFRI-5,AFRI-3,IWST-8, IFGTB-1,RFRI-1,HFRI-1**	

Note: All figures are Rs. in lakhs

Programme 1: All India Coordinated Programme on Agroforestry

Nodal Institute: Tropical Forest Research Institute, Jabalpur Nodal Officer: Dr. Nanita Berry, Sci. D

Component		Duration (Years)	Component PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
C1	Enhancing fodder productivity through Silvi-pasture system on degraded land of India	5	Dr. Ranjana Arya, Sci. E AFRI	29.95	5.70	3.48	-	1.26	Nil	2.22	AFRI FRI	1.79 1.69	--
C2	Impact assessment of existing agro-forestry system for livelihood security and Carbon sequestration in lower hills of Himachal Pradesh and Jharkhand	4	Dr. Vijendra Pal Panwar, Sci. C, HFRI	31.10	6.28	-	-	-	-	-	-	-	To be considered under Climate Change Programme
C3	Evaluation of *Madhuca indica* based silvi-agri system in arid and semi - arid zones of India.	5	Dr. Nanita Berry Sci. D, FRI	32.75	5.57	4.37	-	1.26	Rotatory shaker (Rs.0.85); Digital pH meter (Rs.0.17); Spectro-photometer (Rs.4.47 lakh	3.11	TFRI IFP	2.19 2.18	Budget requested for Equipment Rs. 5.49 lakhs
C4	Study on silvi-medicinal system in arid and semi-arid Himalaya and tropical zones of India.	4	Dr. Charan Singh, Sci.C FRI	32.75	6.17	5.55	-	1.89	GPS- 8.66 (Rs. 0.25/-)		FRI TFRI	1.87 1.84	Budget requested for equipment AFRI1.84Rs.0.25/-
C5	Tree crop interaction study of existing MPTs based silvi-agri system in arid and semi-arid region of India.	4	Dr. Bilas Singh R.O., AFRI	20.21	4.60	1.60	-	0.63	Nil 2.97		AFRI	1.60	--
Total		-	-	**146.76**	**28.32**	**15.00**	-	**5.04**	**5.49+.25= 5.74 (extra)**	**15.00**	-	-	--

Programme 2: Network Programme on Insect Pests and Diseases of Forest Tree Species and their Control Measures

Nodal Institute: Forest Research Institute, Dehradun Nodal Officer: Dr. Mohd. Yousuf, Sci. F & Head Entomology Division

Component		Duration (Years)	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
C1	Biology of hispine Bamboo borer- Estigmena chinensis	4	Dr. K.P. Singh	10.16	2.49	2.34	10.01	0.63	-	1.71	FRI	-	FRE including wages of one

Component		Duration (Years)	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
	Hope (Coleoptera: Chrysomelidae) damaging green standing bamboo and its management		Sci. C, FRI										skilled worker
C2	Survey, evaluation and management of important insect- pests and diseases of *Anogeissus pendula*	3	Dr. Shiwani Bhatnagar, Sci. B, AFRI	18.81	8.28	Pend.	N/A	N/A	N/A	N/A	N/A	N/A	-
C3	Evaluation of some biopesti -cides for the management of termites in nurseries and plantations	4	Dr. Shamila Kalia, Sci. E, FRI	13.90	3.60	Pend.	N/A	N/A	N/A	N/A	N/A	N/A	-
C4	Preliminary studies on bioactive compounds of *Mytilopsis sallei* to mitigate marine wood biodeterioration	2	Dr. M.Balaji Sci. D, IWST	4.50	2.00	1.78	3.63	0.63	-2.55 Mainte-nance Equip.	IWSI Vishakha-patnam	-		Man power : one Project Assistant
C5	Eco-friendly management of bark eating caterpillar, *Indarbela quadrinotata* on aonla (*Emblica officinalis*) in plantations	3	Dr. P. B. Meshram, Sci. F, TFRI	6.57	2.39	2.09	6.07	0.53	0.30	1.26	TFRI	-	-Man Power One FA. Equipment : Digital Camera with accessories
C6	Studies on diversity of egg parasitoid wasps Trichogramma spp. From Punjab and Haryana and their application in biolo-gical control of important forest insectests	4	Dr. Mohd. Yousuf, Sci. F, FRI	21.96	8.22	4.80	11.94	0.90	3.0	0.90	FRI	-	Man Power One PA Equipment : Stereoscopic dissecting Microscope with photographic arrangement
C7	Development of rearing technique for production of insect predator, *Canthecona furcellata,* as biocontrol agent for larval defoliators	3	Sh. Subhash Chandra Sci. B, TFRI	7.52	3.19	2.99	7.32	0.70	1.2	1.09	TFRI	-	Man power: One FA Equipment: One BOD incubator
C8	Treerich Biobooster: A Novel approach to synergise growth and pest management in fast growing industrially important tree species	3	Dr. S. Murugesan, Sci. F, IFGTB	25.09	13.26	External funding -DBT	N/A	N/A	N/A	N/A	N/A	N/A	P.I. may try for the External funding (DBT).
	Total			**108.51**	**43.43**	**14.00**	**-**	**3.39**	**4.50**	**6.11**	**-**	**-**	**-**

Programme 3: Network Programme on Non Timber Forest Resource: Value Addition for Livelihood Generation

Nodal Institute: Tropical Forest Research Institute, Jabalpur Nodal Officer: Dr. A.K. Pandey, Sci. F

Component		Duration (Years)	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
C1	Standardization of non-destructive harvesting practices of *Terminalia chebula* (Harra fruits) and *Soymida febrifuga* (Rohini bark and fruits).	3	Sri Hariom Saxena, Sci. B, TFRI	8.86	3.03	-	-	-	-	-	-	=	Pend
C2	Evaluation of *Schleichera oleosa* (Kusum) fruits for their nutritional value and development of value added products for economic development of local people.	3	Dr. S.C. Biswas, Sci. B, TFRI	5.26	1.88	1.00	1.00	0.30	0.20	0.50	-	-	-
C3	Quantification, value addition of NTFP and improved agricultural productivity to enhance livelihood opportunities in tribal belt of Sirohi District of Rajasthan.	5	Dr. Sangeeta Tripathi, R.O., AFRI	14.83	1.92	1.50	1.50	0.60	0.30	0.60	-	-	-
C4	Studies on the traditional knowledge of medicinal plants used by Nepali community in Assam and identification of important species for chemical analysis.	3	Dr. H.N. Dhungana, Sci. B, RFRI	5.69	1.49	-	-	-	-	-	-	-	Pend
C5	Status Survey and Mapping of Ashtavarga Group of Medicinal and Aromatic Plants (MAPs) in Himachal Pradesh	5	Dr. Vaneet Jishtu, Sci.B, HFRI	19.75	1.96	2.00	2.00	1.30	-	0.70	-	-	
C6	Optimization of Post- Harvest Processing for *Picrorhiza kurrooa* Royle and *Valeriana jatamansi* Jones	3	Dr. Rajasekaran, Sci. C, HFRI	16.84	5.73	-	-	-	-	-	-	-	Pend
C7	Promotion of integrated livelihood support through and tasar cultivation in lac Chotanagpur plateau.	4	Dr. Arvind Kumar, Sci. C, IFP	30.07	14.20	--	-	-	-	-	-	-	External funding
	Total			**101.30**	**30.21**	**4.50**	**4.50**	**2.20**	**0.50**	**1.80**	**-**	**-**	**-**

Programme 4: All India Coordinated Programme on Bamboo for Resource Management, Value Addition and Skill Development

Nodal Institute: Rain Forest Research Institute, Jorhat Nodal Officer: Dr. T.C. Bhuyan, Research Officer

Component		Duration (Years)	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
S1C1	Stability analysis of Candidate Plus Clumps (CPCs) of Bamboos and Identification of CPCs Specific SSR Marker	3	Mohd Ibrahim, Sci.B, RFRI, Jorhat	24.74	13.59	-	-	-	-	-	-	-	Can be considered under Genetic Programme
S1C2	Genetic variability assessment of *Dendrocalamus longispathus* (Kurz) Kurz in Mizoram and Tripura	3	Shri R. K. Meena, Sci. B, RFRI, Jorhat	34.21	15.66	-	-	-	-	-	-	-	-
S1C3	Productivity studies on commonly cultivated bamboo species in different agro climatic zones of Tamil Nadu	5	M. Maria, D. Savio, Sci. D, IFGTB	19.11	4.16	2.28	-	0.70	-	1.58	-	-	Field Assistant salary for 10 months only
S1C4	Selection of efficient AM fungi, PSBs and *Azospirillum* for productivity enhancement of *Dendrocalamus strictus* and Bambusa bambos.	4	Dr. K.K. Srivastava, Sci. F, AFRI	15.00	5.40	-	-	-	-	-	-	-	Pend
S1C5	Biomass, NPP and edible shoot production in some in dustrially imptt. bamboo species in semiarid & humid tropics of Peninsular India	3	Dr. S.Viswanath, Sci. E, IWST	16.88	4.52	2.48	-	-	0.50	1.98	-	-	Soil auger, Soil core sampler Automatic portable weather station, portable weighing, sieves, balance, digital caliper, digital height measuring instrument
S1C6	Study on post flowering regeneration status of *Melocanna baccifera* in Tripura	4	Shri G Banerjee, DCF, RFRI	25.57	6.07	3.34	-	0.70	-	2.64	-	-	Field Assistant salary for 10 months only
S2C1	Effect of flowering on culm quality of *D. brandisii* and to explore its potential for bamboo composite products.	3	Ms.Amita Pant, Sci. B, IWST	10.23	3.50	1.90	-	0.70	-	1.20	-	-	Field Assistant salary for 10 months only
S2C2	Management of fungal discoloration of bamboo for handicrafts, furniture and other utility items to help artisans	4	Dr. N. S. K. Harsh, Sci. F, FRI	14.99	3.50	-	-	-	-	-	-	-	Pend
S2C3	Studies on finishing aspects of *Dendrocalamus strictus*	2	Dr. Krishan Kumar, Sci. F, FRI	5.20	2.60	-	-	-	-	-	-	-	Pend

Component		Duration (Years)	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
S2C4	Capacity building, skill up-gradation of artisans, promotion of traditional bamboo handicraft & art with improved technology, suitable design and value addition	3	Dr. T. C. Bhuyan, R.O., RFRI	25.28	11.38	-	-	-	-	-	-	-	External funding (NBM/ NMBA)
	Total			**191.21**	**70.38**	**10.00**	**-**	**2.10**	**0.50**	**7.40**	**-**	**-**	

Programme 5 : Inter Institutional/Network Programme on Utilization Potential of Timber from *Melia composita syn. Melia dubia*

Nodal Institute : Forest Research Institute, Dehradun Nodal Officer: Dr. Vimal Kothiyal, Sci. F

Component		Duration (Years)	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
C1A1	Evaluation of wood Properties of *Melia composita* ages from southern India for of different finding suitability for various uses and development of value added products	3	Dr. S. K. Sharma, Sci. F, IWST	7.70	3.16	1.90	6.44	-	1.00	0.90	-	-	PA for last two years only
C1A2	Development of NIR spectroscopy based application methods for evaluation of physical and mechanical properties of *Melia composita (Syn M. Dubia)*	3	Dr. Vimal Kothiyal, Sci. F, FRI	6.00	0.70	0.65	6.00	-	NIL	0.65	-	-	JRF for last two years only
C1A3	Non-destructive in-situ assessment of wood quality in *M. composita.*	3	Dr. S.S. Chauhan, Sci. E, IWST	7.75	4.10	Pend	7.75	-	-	-	-	-	Pend

Component		Duration (Years)	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
C1A4	Variation of growth stresses in *Melia composita*	3	Dr. P. Aggarwal, Sci. E, IWST	8.95	3.16	1.17	8.95	0.63	-	0.54	-	-	Rs. 4.50 lakhs for equipment to be procured in 2nd year.
C2B1	Studies on working and finishing aspect of *Melia composita*	4	Dr. Kishan Kumar, Sci. F, FRI	31.5	6.00	1.95	18.48	-	-	1.95	-	-	PA for last three years only
C2B2	Vacuum Press drying studies of *Melia composita*	3	Sh. Shlainder Kumar, R.O., FRI	4.35	1.00	1.00	3.35	-	-	1.00	-	-	-
C2B3	Studies on natural durability of plantation grown species with conventional/eco-friendly preservatives (ZIBOC)	5	Dr. Sadhna Tripathi, Sci. F, FRI	9.91	2.76	1.13	8.08	0.63	-	0.50	-	-	FA for all 5 years
C2B4	Durability & treatability of *M. composita* (Application of new preservatives for enhancing durability of timber)	2	Smt. Venmalar, Sci. B, IWST	2.00	1.00	0.76	2.00	-	-	0.76	-	-	-
C3C1	Study of Nanoclay as filler on physical and mechanical properties of plywood	3	Ms. Ismita Nautiyal, Sci. B, FRI	4.50	1.55	0.98	4.30	-	-	0.98	-	-	-
C3C2	Development of composites of lops and tops of *M. composita*	3	Sh. D.P. Khali, Sci. E, FRI	9.60	3.20	1.65	8.10	0.75	-	0.90	-	-	-
C3C3	Development of composite material by impregnating nano particles in low density *Melia composita* wood to enhance the properties for its value addition		Dr. S. R. Shukla, Sci. E, IWST	33.75	27.85	-	-	-	-	-	-	-	Pend
C3C4	Wood modification of *M. composita* for improving its dimensional stability and durability (Chemical modification)	3	Dr. K.K. Pandey, Sci. F, IWST	9.40	3.65	2.05	8.40	-	1.00	1.05	-	-	JRF for last 2 years only.
C3C5	Wood modification of *Melia composita* for improving its dimensional stability and durability (Thermal Modification)	3	Dr. S. R. Shukla, Sci. E, IWST	6.15	2.91	-	-	-	-	-	-	-	Pend
	Total			**143.31**	**60.44**	**13.24**	**-**	**2.01**	**2.00**	**9.23**	**-**	**-**	**-**

Programme 6: Inter Institutional / Network Programme on Chemistry of Forest Products for Value Addition

Nodal Institute: Forest Research Institute, Dehradun Nodal Officer : Dr. Y.C. Tripathi, Sci. E

Component		Duration (Years)	Component PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs.Rs. in lakhs)			Collaborating Institutes with Budget	Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other		
C/1	Utilization of *Pinus roxburghii* needles for value added products	3	Dr. Vineet Kumar, Sci. E, FRI	9.06	2.94	1.50	4.50	Nil	Nil	1.50	Nil	-
C/2	Structural studies and utilization of *Acacia tortilis* gum exudates	3	Dr. Vineet Kumar, Sci. E, FRI	9.16	2.94	1.50	4.50	Nil	Nil	1.50	Nil	-
C/3	Prospecting fungal resources for development of natural dye	3	Dr. Rakesh Kumar, Sci. C, FRI	11.70	2.94	1.50	6.18	Nil	Nil	1.50	Nil	Services of at one FA will be required in subsequent years
C/4	Chemical interventions for utilization of *Eucalyptus* bark residue from wood conversion industries	3	Dr. V.K. Varshney, Sci. E, FRI	12.02	3.84	-	-	-	-	-	-	Pend
C/5	Studies on chemoenzymatic treatment of black liquor for recovery of reducing sugars	3	Dr. P. K. Gupta, Sci. E, FRI	9.10	4.22	-	-	-	-	-	-	Pend
C/6	Biochemical evaluation of germplasm of *Asparagus racemosus* and *Tinospora cordifolia*	3	Shri Pankaj Singh Sci., IFP	11.70	8.15	-	-	-	-	-	-	Pend
C/7	Evaluation of phyto-polymers as eco-friendly bioadhesives	3	Shri Neelu Singh, Sci. E, TFRI	9.91	3.60	1.50	4.66	Nil	0.30	1.20	Nil	-
C/8	Chemical derivatization of α-cellulose into value added products	3	Dr S.S. Bisht, Sci. B, IWST	15.00	6.20	1.50	5.20	Nil	Nil	1.50	Nil	-
C/9	Studies on the variations in major chemical constituents of selected plant species from different agro-climatic regions of Chhattisgarh for quality produce	3	Dr. H.O. Saxena, Sci., TFRI	6.51	2.38	-	-	-	-	-	-	Pend
C/10	Screening of Higher Basidiomycetes Fungal Resources for Bioactive Cholesterol and Triglycerides Lowering Agents (Statins)	1	Dr. V.K. Varshney, Sci. E, FRI	2.33	2.33	1.50	1.50	Nil	Nil	1.50	Univ of Haifa, Isreal	-
	Total			**96.49**	**38.54**	**9.00**	**26.54**	**0.00**	**0.30**	**8.70**	**-**	**-**

Programme 7: Network Programme on Wood Science and Technology for Livelihood and Economic Growth

Nodal Institute: Institute of Wood Science and Technology, Bangalore Nodal Officer: Dr. S.K.Sharma, Sci.F

Component		Duration (Years)	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail Current year (Rs. in lakhs)			Collaborating Institutes with Budget		Remarks
				Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	Inst.	Budget	
C1	To develop Medium Density Fiber Board (MDF) from lops and tops of poplar	3	Ms. Ismita Nautiyal, Sci. B, FRI	8.50	6.15	5.35	7.35	Nil	5.00	0.35	Nil	Nil	Nil
C2	Refinement in vacuum timber dryer designed by FRI and its performance studies	2	Mr. N.K. Upreti, Sci. F, FRI	2.00	1.67	1.13	2.00	Nil	1.00	0.13	Nil	Nil	Nil
C3	Microwave assisted chemical modification of wood	2	Dr. K.K. Pandey, Sci. F, IWST	6.63	1.67	1.28	3.30	0.63	-	0.65	Nil	Nil	PA for 8 months
C4	Determination of the treatability and durability of imported timbers as per bureau of Indian standards	6	Dr. R. Sundararaj, Sci. F, IWST	8.80	2.31	1.50	8.50	Nil	Nil	1.50	Nil	Nil	Nil
	Total		-	**25.93**	**11.80**	**9.26**	**21.15**	**0.63**	**6.00**	**2.63**	**Nil**	**Nil**	**Nil**

Programmes: 07

Components submitted: 57

Components Approved: 33

Approved Budget for 2012-13: Rs. 75 Lakhs

Thrust Area - II: Biodiversity Conservation and Ecological Securities

Biological Diversity or Biodiversity implies the variation of life forms within a given ecosystem, biome or on the entire Earth. It is often used as a measure of the health of biological systems. The biodiversity found on Earth today consists of many millions of distinct species. Over the past half-century, human activities have caused an unprecedented decline in biological diversity. Species are becoming extinct a thousand times faster than the natural rate which has been further compounded by climate change. The growth of large urban areas, construction activities such as dams, buildings and roads, encroachment on vast areas of forest lands for extension of arable expanses and mining operations are examples of direct onslaughts on nature which have been adversely affecting the diversity of life or biodiversity. Loss of species and habitats, ruthless exploitation of plant diversity, wildlife trade, pollution, and climate change are the concerns requiring efforts to be effectively addressed. A wide variety of environmental goods and services are under threat with profound and damaging consequences for ecosystems, economies and livelihoods.

Biodiversity loss and the decline in ecosystem services pose major risks to society including business. Hence, it is vital to maintain the healthy balance between rapid development and conservation of our rich biodiversity and natural resources. Globally, enormous efforts are being made to significantly reduce the current rate of biodiversity loss. The most important being Convention on Biological Diversity, which focuses on conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

International Union for Conservation of Nature (IUCN) classifies species facing risk for survival into various Red Data Categories such as Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC) and Not Evaluated (NE). This thrust area is intended to highlight the status and distribution of rare and endangered plant species in different forest ecosystems of India and studies carried out under it will focus on inventorization, characterization and conservation strategies for rare and endangered plant species of different forest ecosystems of India.

IUCN works to halt and reverse the loss of biodiversity by harnessing knowledge, developing standards and tools, convening scientists and policy-makers and influencing policy from global to local levels. It is filling the knowledge gap on the status of biodiversity and improving our understanding of the pressures that lead to biodiversity loss. This allows policy-makers to make informed decisions based on the latest scientific knowledge.

The IUCN maintains the Red List, which provides latest information on the status of rare, threatened and endangered (RET) species and threats operating on them. It also gathers information on role importance of species support livelihoods and biodiversity conservation in tackling the climate change. This knowledge allows IUCN to influence a host of international conventions, including the Convention on International Trade in Endangered Species (CITES) for conservation strategies on land and at sea and sustainable utilization of species. IUCN uses Red List data to develop indicators that are useful to policy makers at all levels as a measure of progress in achieving the UN Millennium Development Goal on sustainable development.

India is one of the 17 mega diversity countries of the world. With only 2.4% of the world's land area, 16.7% of the world's human population and 18% livestock, it contributes about 8% of the known global biodiversity, however, putting enormous demands on our natural resources. As a key tool for biodiversity conservation India has developed a network of 668 Protected Areas (PAs), which extends over 1,61,221.57 sq. km. (4.90% of total geographic area). There are 4 categories of the Protected Areas viz. National Parks, Sanctuaries, Conservation Reserves and Community Reserves. India's protected area network comprises of 102 National Parks, 515 Wildlife Sanctuaries, 47 Conservation Reserves and 4 Community Reserves. Besides, UNESCO has designated 5 Protected Areas as World Heritage Sites. As the ecosystems and species do not recognize political boundaries the concept of Tran boundary Protected Areas has been initiated for coordinated conservation of ecological units and corridors and buffer zones with bilateral and/or multilateral cooperation of the neighbouring nations.

Bioprospecting is a search for useful organic compounds in microorganisms, plants, and fungi that grow in extreme environments, such as rainforests, deserts, and hot springs. In the United States alone, 56 % of the top 150 prescribed drugs, with an economic value of $80 billion, are linked to discoveries made in the wild. In some cases bioprospectors obtain useful materials by harvesting the organisms, which adversely affects the fragile ecosystems. This 'supply issue' is still a limiting factor for some areas of research.

Most of the potential bioprospecting is currently related to the study of microorganisms. Microorganisms can live almost everywhere, including the bottom of the ocean, in Antarctica's ice, and in the boiling pools in Yellowstone National Park. The study of microorganisms will lead to many new discoveries over the next few decades as most of the life on Earth is microscopic.

In view of importance of Biodiversity Conservation and Ecological Security, an ambitious programme is being envisaged under this thrust area with following AICPs:

- Silviculture of Indian Trees
- Nursery Technique
- Seed Science and Technology of Indian Tree Species
- Invasive Species
- Rare and Endangered Species
- Biopiracy and Bioprospecting
- Restoration and Reclamation of Degraded sites

Status of Approved Programs / components at a glance for THRUST AREA -II

Programme	Components	Total Budget (Rs. in lakhs)	Current Year (2012-13) (Rs. in lakhs)	Priortized No. of components	Approved budget for 2012-13	Remarks
All India Coordinated Project on Silviculture of Indian Species	6	179.75	35.95	2	3.00 5.00	HFRI, Simla IFGTB, Coimbatore
Networking Project on Nursery Technique	3	42.31	8.46	1	5.00	HFRI, Simla

Programme	Components	Total Budget (Rs. in lakhs)	Current Year (2012-13) (Rs. in lakhs)	Priortized No. of components	Approved budget for 2012-13	Remarks
Networking Project on Seed Science Technology of Indian Tree Species	4	53.05	13.262	1	3.00	TFRI, Jabalpur
All India Coordinated Project on Invasive Species	1	883.00	2.89	1	2.00	FRI, Dehradun
Networking Project on Rare and Endangered Species	1	586.58	5.89	1	4.00	FRI, Dehradun
All India Coordinated Project on Biodiversity and Bioprospecting	4	116.04	33.631	2	4.00 3.00	AFRI, Jodhpur RFRI, Jorhat
Networking Project on Restoration and Reclamation of Degraded Sites	4	123.15	24.63	1	4.00	CSFER, Allahabad
TOTAL	**23**	**1843.14**	**124.413**	**9**	**33.00**	

Details of Programme for Thrust Area - II

Component	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	
Silviculture of Indian Trees Introduction trial of *Diploknema butyracea* (Roxb.) H. J. Lam and *Myrica esculenta* Buch. Ham. in mid-hill conditions of Himachal Himalayas	Dr. Sandeep Sharma, Sci. E, HFRI	15.5	3.1	3.00		PA-1	Nil		FRI
Nursery Technique Biology and Management of Insect pests of seeds of *Juniperus polycarpus* C.Koch and evaluating the insect-pests resistance performance in the nursery	Dr. Pawan Kumar, Sci., HFRI	8.56	2.853	5.00		Nil	Nil		

Component	Component PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	
Biobooster: A Novel Approach to Synergise Growth and Pest Management in Fast Growing Industrially Important Tree species	Dr. S. Murugesan, Sci. F, IFGTB	25.09	5.018	5.00		PA-I	Nil		FRI-
Seed Science and Technology of Indian Tree Species Standardization of the techniques for germination, collection and maintenance of maximum viability of four important tropical species: *Bridelia retusa, Sterculia urens, Boswellia serrata* and *Saraca indica.*	Dr. Maitreyee Kundu, Sci. E, TFRI	8.46	2.115	3.00	Nil	Nil			
Invasive Species Impact of invasive species on plant diversity in selected forest sites of Uttrakhand, Haryana, Punjab	Dr. Anoop Chnadra, Sci. C, FRI	8.67	2.89	2.00		Nil	Nil		
Rare and Endangered species AICP on inventorization, characterization and conservation strategies of selected rare and endangered of India	Dr. Anoop Chnadra, Sci. C, FRI	586.58	5.00	4.00		Nil	Nil		
Bioprospecting and Biopiracy Ecology, utilization and conservation of Garcinia species in Upper Brahmaputra Valley, Assam	Dr. Dandeswar Dutta, Sci., RFRI	17.85	5.95	4.00		FA-I	Bio-analyser		FRI
Phytochemical evaluation, development of nursery practices and conservation of germplasm of Withania coagulens (Stocks) Dunal, an endemic and endangered species of Thar desert	Dr. Mala Rathore, Sci. D, AFRI	19.834	4.958	3.00		PA-I	Nil		FRI
Restoration and Reclamation of Degraded Sites Restoration of Sand Stone Mining Area of Vindhyan Region through Microbial Technology.	Dr. Kumud Dubey, Sci. D, CSFER	29.45	5.89	4.00		JRF-I	Kjedahl unit, pH meter		FRI

Programmes: 07

Components submitted: 22

Components Approved: 09

Approved Budget for 2012-13: Rs. 33 Lakhs

Thrust Area III: Forests and Climate Change

Climate change and variability are impacting different ecosystem processes and functioning. Processes through soil-vegetation-atmosphere transfer (SVAT) in forest ecosystems are operating on multiple spatial and temporal scales. Response time of forest ecosystems to disturbances ranges from the short-term up to decades and even centuries, depending on the condition of the system and the type, intensity and duration of the external stimuli. The actual state of forest ecosystems largely depends on processes of the past. To understand the consequences of Climate Change on forest ecosystems, assessment of its impacts on Natural Ecosystem Processes is required. A detailed study of the influence of forests on the hydrological cycle of an area is necessary to understand the role forests play in providing this elixir of life. A data base on biomass growth rates, carbon sequestration potential, soil organic carbon etc is also required to be developed for a realistic assessment of the mitigation potential. Modelling studies are required to project climate change impact on forest ecosystems, and adaptation needs in the forestry sector.

The ecosystem response and causal factors are inter-related to each other; studies and experimentations on them separately are not likely to yield the desired results. Thus an all encompassing study is required to assess how temperature build up directs the changes in physiological and morphological characters of plant species leading them to shift to alternate areas or that the disruption of hydrological cycle of an area is the prime reason for changes in the plant habitat leading to changes in biodiversity, water availability, soil water stress and flow to rivers & recharging of aquifers. Without such an interdisciplinary approach to such core issues, the vulnerability assessment cannot be comprehensive and adaptation strategy linked to the livelihood of forest people will not be conclusive.

Subsidiary Body for Scientific and Technological Advice SBSTA of United Nations Framework Convention on Climate Change (UNFCCC) at its 34th meeting, dialogue on research needs and priorities to support emerging issues under the UNFCC has also underlined strong need to maintain systematic observations on a continuous basis, to improve coverage of observations (e.g Himalayas, Africa) and to collect and analyze historical data.

The National Mission for a Green India and the National Mission for Sustaining the Himalayan Eco-System are two of the eight Missions under the National Action Plan on Climate Change (NAPCC) which recognize that climate change phenomenon will seriously affect and alter the distribution, type and quality of natural biological resources of the country. The Green India Mission envisages supporting long term research to study vegetation response to climate change; silvicultural and management response to achieve the Mission objectives; pilot adaptation projects to develop adaptation options, strategies and practices; benchmarking carbon capture potential of ecosystems and economic evaluation of ecosystem goods and services; measuring degradation within density class ranges, etc. Further there is urgent need to mainstream climate change aspects such as impacts, vulnerability, adaptations, mitigation and REDD+ into forest management through community participation.

An all encompassing study in program mode is launched under the aegis of ICFRE titled "All India Coordinated Climate Change Forestry Research Programme (AICFP-INDIA)" for undertaking studies to improve our understanding and assessment of the impacts of climate change on forest ecosystem processes and functioning and to make informed decisions on practical adaptation actions and mitigation measures.

Impacts of Climate Change on forest ecosystem are getting manifested as species range shifts, changing biodiversity, phenological changes in plant life cycles, forest growth pattern of species, changing boundaries of ecosystem, and other biotic and a-biotic responses/ stresses. Research in these topics is relevant for understanding the forest ecosystem processes and functioning to establish the knowledge base needed for monitoring and predicting the impacts of climate change. Although the timing and magnitude of specific ecological affects that might be caused by future climate changes are poorly understood but, the society places a high value on ecosystems and their component organisms (i.e., the plants and animals living in ecosystems). Hence there is an urgent need to develop an improved scientific understanding of the likely effects of climatic change on terrestrial ecosystems. This will facilitate enhanced knowledge on the effects of management options on functions and processes in forest ecosystems and their environmental services.

Temporal dynamics of forest ecosystems operate on multiple time scales. Long observation periods are, therefore, necessary in order to identify the key processes that govern the system's behaviour at a considered time scale. The persistent effects of past events are maintained as legacies that can only be resolved and understood by studies which cover the characteristic time scale where these effects are expressed.

Future atmospheric and associated climatic changes are likely to have marked effects on forest ecology impacting both products and the environmental services derived from forests. Increasing concentrations of CO_2 in the atmosphere have the potential to significantly affect forest growth rates, the amount of carbon stored in forest ecosystems, forest biodiversity and the quantity and quality of water derived from forested catchments. Increasing CO_2 concentration interacts in complicated ways with climate, land use and land management, and major anthropogenic and natural disturbances to determine landscape and national impacts. Improved understanding of how elevated CO_2 affects forest growth land systems and surface-atmosphere interactions, will also improve climate models and potentially the reliability of regional climate predictions. Plants respond to rising CO_2 through increased photosynthesis and reduced transpiration. Photosynthesis removes CO_2 from the atmosphere and respiration by plants and heterotrophs, add it back. Thus, the terrestrial biosphere is not just a passive respondent to rising CO_2 but can play a fundamental role in determining the rate of global change.

For the control and management of sustainability in the development of the forest resources, specific scientific knowledge needs to be considerably deepened and enlarged. The forest composition and canopy structure for the impact of environmental changes and site conditions; and their modification through management need to be analyzed on a broad scale. Sensitive parameters for assessing the state of the forest ecosystems with respect to their resilience towards environmental threats need to be identified.

Following Programmes are envisaged under this thrust area.

Programme 1 : Impact component

Programme 2 : Adaptation component

Programme 3 : REDD+ and Mitigation component

Programme 4: Reassignment of Forest Types

To start with pilot projects, will be taken up by FRI, Dehradun to finalize the methodologies for its upscaling and replication in other Institutes.

Management of the forest is another area where ICFRE inputs are important for sustainable utilization of resources. Over the years the classifications of forest have changed. All Institute of ICFRE will be involved in studying change matrics of forest types of India.

Details on Forests and Climate Change

Component	Budget proposed (Rs. in lakhs)	Budget approved (Rs. in lakh)		Approval detail			Collaborating Institutes
	Total outlay	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	
Impact Component To undertake the dendrochronological analysis of different trees growing in different meteorological settings	18.00	15.00	28.00	JRF-1	Tree ring analysis system (15.00)	-	FRI
To correlate forest fire incidences with burnt area severity, flammability and climate variability	10.00	-	-	-	-	-	-
Adaptation Component Assessment of ecosystem services imparted by forests of Uttarakhand	69.74	5.00	69.74	RA-I, JRF-1, Daily wage-4-	-	-	FRI
Mitigation Component Process based carbon sequestration study	20.00	15.00	20.00	RA/ SRF/ JRF-1	Portable Photosynthesis Analyzer		FRI
Total	**117.74**	**35**					

TOTAL APPROVED BUDGET (2012-13) OF THE PROGRAMME THRUST AREA III - Rs.35.00 Lakh

Progress On Forest Type Study - Budget Details for Forest Type Studies

Institute	FRI	HFRI	IWST	AFRI	TFRI	IFGTB	RFRI	IFP	Total
Sample Points Allotted	272	317	117	168	103	295	295	247	1814
State Wise Break up	U.P.- Uttarakhand- Punjab- Haryana- Delhi- Chandigarh-	H.P.- 156 J&K- 161	A.P.- 37 Goa- 12 Karanataka-67	Daman- 01 Diu- 02 DNH- 05 Gujrat- 80 Rajesthan-80	Chattisgarh-30 M.P.- 36 Maharashtra-37	Andaman & Nicobar- 87 Kerala- 42 Pondicherry-02 Tamil Nadu-164	Arunachal Pradesh- 71 Asssam- 85 Mizoram-11 Meghalaya-18 Manipur-38 Nagaland-21 Sikkim- 36 Tripura- 15	Bihar- 21 Jharkhand-08 Orissa- 65 W.B.- 153	

Institute	FRI	HFRI	IWST	AFRI	TFRI	IFGTB	RFRI	IFP	Total
Sample Points already covered State wise Break up	42 U.P.- Uttarakhand- Punjab- Haryana- Delhi- Chandigarh-	90 H.P.- 90 J&K	53 A.P.- 17 Goa- 04 Karanataka-32	65 Daman-Nil Diu- Nil DNH- Nil Gujrat- 02 Rajesthan-63	23 Chattisgarh-Nil M.P.- 16 Maharashtra-37	120 Andaman & Nicobar- 46 Kerala- 29 Pondicherry-Nil Tamil Nadu-45	79 Arunachal Pradesh- 08 Asssam- 28 Mizoram-02 Meghalaya-1 Manipur-05 Nagaland-0 Sikkim- 24 Tripura- 11	73 Bihar-12 Jharkhand-06 Orissa-33 W.B.- 22	545
Expenditure incurred (Rs. in Lakh)	5	4.00	3.833	1.65	0.69	13.0	4.97	1.809	34.952
Additional Expenditure required (Rs. in Lakh)	10	8.00	7.53	4.95	5.14	-	12.476	4.40	52.496
								Total	**87.448**
								ICFRE HQ Expenditure	**13.552**
								Total	**101.000**

Programmes: 04

Components submitted: 21

Components Approved: 04

Budget Approved for 2012-13: Rs. 136 Lakhs

(Rs 35.00 +101 Lakhs)

Thrust Area IV - Forest Genetics Resource Management and Tree Improvement

During V plan period Forest Genetics and Tree Improvement in ICFRE and its institutes got a significant boost when two central sector schemes were initiated. The first one in collaboration with DANIDA as "Indo-Danish on Seed Procurement and Tree Improvement" under which tree improvement was carried out on *Pinus roxburghii, P.wallichiana, Cedrus deodara, Dalbergia sissoo, D.latifolia, Albizia lebbek, Tectona grandis, Bombax ceiba, Gmelina arborea* etc. The second was "Creation of Radio Isotope Laboratory Facilities" to work on physical and chemical mutagenesis of forestry species, calculate the LD-50 dose and screen out variants for future tree breeding work. Improvement through hybridization induced mutation and polyploidy of multipurpose tree species like Eucalyptus, Populus, Siris and Bamboos were other areas of research in which significant progress was made.

Beside ICFRE institutes, Universities, industries and State Forest Departments are also involved in tree improvement programs of important tree species. The various activities of research-involved development of new clones and hybrids, establish seed production areas, plus tree selection and provenance delineation and establishment of seed orchards. The state agriculture universities were more focused on improvement of agroforestry trees species that can be grown under agroforestry system like Eucalyptus, Acacia, Poplars, Grewia, Shisham etc. Future expectations are many and to overcome this challenges faced are to be addressed.

Challenges

Forest degradation: Per hectare growing stock in forests in India has been estimated at around 69 cu m/ha for the year 2005 significantly lower than global average of 110 cu m (FAO 2005). This indicates degraded state of forests. Another matter of concern is the continuing degradation of dense forest to open forests.

Low Productivity: Mean Annual Increment (MAI), a measure of forest productivity, is 0.7 cu m/ha for Indian forests as against the world average of 2.1 cu m/ha. Even plantations raised provide less yield than their potential.

Increasing demand for fuel wood: India is world's biggest consumer of fuel wood. There are different estimates on India's total demand for fuel wood, with reliable estimates putting the figure in the range of 200-230 MT. It is estimated that 58.75 MT of fuel wood comes from naturals forests (FSI, 2011).

Industrial requirements: Paper in India is made from 40% of hardwood and bamboo fibre, 30 % from agro waste and 30 % from recycled fibre. India is the fastest growing market for paper globally and the paper consumption is estimated to touch 13.95 million tons by 2015-16. Since the industry in India is mainly plantation based and is essential that more land must be brought under plantations of trees species suitable for the making of papers for meeting the future requirements.

The program on 'Forest Genetic Resource Management and Tree Improvement' aims to improve the productivity of plantation forest through use of quality seeds and seedlings obtained through tree improvement & breeding program for meeting the demands of farmers, industries and forest department. The mission based program will strengthen the R&D programs for conservation and

management of forest genetic resources which are under great pressure from environmental changes and anthropogenic pressure. Besides, capacity buildings in many frontline areas of research areas will help in addressing the issues of forest degradation, low productivity, demand for fuel wood & timber, resistance against insects-pests, adaptability against climate change and dynamic industrial requirements.

Forest genetics resource management and tree improvement
Conservation of forest genetics resources
Tree improvement
Vegetative propagation
Biotechnology

An exercise was carried out to seek the opinion, comments and suggestions of the scientists working in the related field across ICFRE institutes and the Directors. Based on the opinion and suggestions of the scientists and Directors, and series of discussions with responsive scientists, a broad framework with specific objectives has been developed and is summarized. In general the consensus was to divide the entire research activity under the thrust area in following three programs:

Program 1: Tree improvement and breeding for improved productivity and adaptability

Comprehensive tree breeding program is to be reoriented towards development of productive and adaptive populations and varieties across sites for the benefit of the society. This will include development of a comprehensive tree breeding strategy, breeding populations/mapping population with regard to wood, pulp & resistance properties, and selection, development, testing and deployment of clones/varieties of commercially important tree species for desirable traits. In addition vegetative propagation (micro and macro) of the elite germplasm and to explore possibility of marker-assisted selection (MAS) for breeding and improvement of commercially important tree species.

Program 2 Forest Genetic Resource Evaluation and Conservation

The program to assess the status of FGR using available tools and techniques (molecular and GIS) by taking up (a) population genetic study (genetic diversity, structure, gene flow etc.), (b) phylogenetic and phylogeography study to understand evolutionary potential of species. It will also identify and conserve genetically most diverse hotspot as *in situ* conservation area, and to identify genetically diverse populations to source genetic material of target species for *ex situ* conservation. The following programs are also envisaged:

- Development of in-vitro and long-term conservation techniques (tissue culture, cold room, liquid nitrogen).
- Initiate activities of Forest Genetic Resource Management Network (FGRMN) with following objectives:
    - Collection, documentation, characterization of forest genetic resources and their conservation in collaboration with state forest departments, ICFRE institutes and other national organizations/institutions.

- Establish ex-situ germplasm banks/repositories for conservation of FGR using appropriate tools technologies and dissemination of material and information.

Program 3 Applied Genomic Research and genetic engineering for desirable traits

This program will include:

- Development of Microsatellite markers for important tree species: Microsatellites are the best DNA markers that are useful in numerous applications like genetic diversity, structure, gene flow, fingerprinting for forensics and IPR issues etc.
- Develop understanding the association of genes/gene regions including QTL mapping and association mapping in forest trees with quantitative (growth) and qualitative traits (disease and pest resistance, drought and salt tolerance, wood & pulp characters).
- Understand the molecular mechanism determining a trait in different tree species.
- Genetic engineering of trees for biotic & abiotic stress tolerance and commercially important traits (altered lignin/ cellulose profiles).
- Allele mining for traits related to biotic and a biotic stress
- Development of bioinformatics tools and database for the priority species

Status of Approved Programs / components at a glance for THRUST AREA -IV

Sr. N.	Activity	Research components	Total cost	components approved	Budget requirement for 2012-13 (Rs. in lakhs)	Approved budget for 2012-13 (Rs. in lakhs)
A.	PROGRAM 1: Tree improvement and breeding for improved productivity and adaptability	108	5054.33	3	578.28	68
B	PROGRAM 2: Forest Genetic Resource Evaluation and Conservation	17	166.1	4	49.53	12
C.	PROGRAM 3: Genomic Research and genetic engineering for desirable traits	4	172.62	-	72.72	-
	GRAND TOTAL	**129**	**5393.05**	**7**	**700.53**	**80.0**

Programme I: Tree Improvement and breeding for improve productivity and adaptability

1. All India Coordinated programme for genetic improvement of *Eucalyptus*.

Nodal Institute: IFGTB, Coimbatore

Component	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment	Other	
Genetic diversity assessment for management of Eucalyptus seed orchards	Dr. Rekha Warrier, IFGTB	708.70	83.00	18.00 For the three components	1800	JRF-2 for three component	Incubator shaker, colorimeter, hot plate dry bath	-	FRI, IFGTB, IFP, IWST Paper industries, SFDs
Establishment of second generation seed orchards and selection of clones for high productivity in Eucalyptus	Dr. V. Shiv kumar, IFGTB							-	
Incorporating resistance in Eucalyptus to *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae) through expression of insect specific dsRNA	Dr. N.V. Matish, IFGTB							-	

2. All India Coordinated programme for genetic improvement of Teak

Nodal Institute: TFRI, Jabalpur

Component	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment	Other	
Selection of plus trees, raising their progeny trials and establishing germplasm bank (TFRI, Jabalpur)	Dr. S.A. Ansari, TFRI & his team	711.31	56.63	TFRI 14.2	TFRI 14.2	JRF-1, FA-2 for four components	PCR & electro-phoresis equipments	-	FRI, IFGTB, TFRI, SFDs

Component	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment	Other	
Development of management practices of teak seed production areas, seedling seed orchards and clonal seed orchards (TFRI & SFRI)	Dr. S.A. Ansari, TFRI & his team			For four components				-	
Production of transgenic teak tolerant to defoliating pests (TFRI, Jabalpur)	Ms. Trisa Dominic, TFRI & her team							-	
Studies on population structure, linkage disequilibrium and marker-trait association mapping of teak (FRI &TFRI, Jabalpur)	Dr. S.A. Ansari, TFRI & his team							-	
Developing breeding populations of teak with broad genetic base for long term genetic improvement (IFGTB, Coimbatore)	Dr. B. Gurdev Singh, IFGTB & his team			IFGTB 5.8	IFGTB 5.8	FA-2 for two components		-	
Gene-ecological variation in teak populations of Kerala and Tamilnadu (IFGTB)	Dr. R. Yasodha, IFGTB & her team			-				-	

3. All India Coordinated programme for genetic improvement of *Melia*

Nodal Institute: FRI, Dehradun

Component	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment	Other	
Survey of natural forests and man-made plantations to select candidate and plus trees (FRI, Dehradun)	FRI - Dr Ashok Kumar RFRI - Dr Tara Chand IWST- Dr Arun Kumar IFGTB - Dr Rekha Warrior AFRI - P H Chawhaan FRC - Dr GRS Reddy	793.00	114.0	FRI 9.19 RFRI 4.69 IWST 4.69 IFGTB 3.81 AFRI 3.56 FRC 4.06	FRI 9.19 RFRI 4.69 IWST 4.69 IFGTB 3.81 AFRI 3.56 FRC 4.06	FRI 1 JRF RFRI 1 JRF IWST 1 JRF IFGTB 1 FA AFRI 1 FA FRC 1 FA	- - 	- - 	FRI RFRI IWST IFGTB AFRI FRC

Component	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment	Other	
Studies on seed parameters for increasing quality and quantity of planting stock	FRI - Dr Ashok Kumar IWST - Dr Arun Kumar Dr. Geeta Joshi IFGTB - Dr Rekha Warrior	-	-	-	-	-	-	-	-
Establishment of multi-locational evaluation trials for testing selected genotypes under different agro-climatic conditions for stability, adaptability and productivity	FRI - Dr Ashok Kumar RFRI - Dr Tara Chand IWST- Dr Arun Kumar IFGTB - Dr Rekha Warrior AFRI - P H Chawhaan FRC - Dr G RS Reddy	-	-	-	-	-	-	-	-
Evaluation and screening for disease, insects, salinity and drought	FRI - Dr Ashok Kumar RFRI - Dr Tara Chand IWST- Dr Arun Kumar IFGTB-Dr Rekha Warrior AFRI - P H Chawhaan FRC - Dr G RS Reddy	-	-	-	-	-	-	-	-
Standardize DNA based tools for application of biotechnological interventions and enforce marker assisted selection to improve the productivity	FRI - Dr Ashok Kumar RFRI - Dr Tara Chand FRC - Dr G RS Reddy	-	-	-	-	-	-	-	-

Programme 2: Forest Genetic Resource Evaluation and Conservation

Component	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	
Exploration and Collection of Forest Genetic Resources and Development of National Gene bank.	Dr. K. Palaniswami, IFGTB	48.82	8.98	3.50	3.50	JRF-1	-	-	IFGTB & SFDs

Component	PI/Institute	Budget proposed (Rs. in lakhs)		Budget approved (Rs. in lakhs)		Approval detail			Collaborating Institutes
		Total outlay	Current year 2012-13	Current year 2012-13	Total	Man power	Equipment (lakhs)	Other	
Collection of germplasm of *Madhuca indica* J. F. Gmel for identification of best sources in Chhattisgarh through phytochemical evaluation	Dr. Fatima Sirin, TFRI	11.04	3.47	3.0	3.0	FA -1	-		TFRI & SFDs
Tree Borne Oil seeds (TBOs) in community lands for Improved Livelihoods of Vulnerable Groups of Jharkhand	Dr. Animesh Sinha, IFP	23.34	8.1	2.50	2.50	FA-1	-		IFP & SFDs
Assessment of variability, improvement and refinement of cloning techniques of *Tecomella undulata* (Sm.) Seem	Ms. Desha Meena, AFRI	52.42	14.01	3.0	3.0	-	-		AFRI & SFDs

TOTAL APPROVED BUDGET (2012-13) OF THE PROGRAMME THRUST AREA IV - Rs. 80.00 Lakh

Programmes: 03

Components submitted: 129

Components approved: 07

Budget approved for 2012-13: Rs. 80 Lakhs

5 Conclusion

Benefits derived from forests are diverse and therefore research in the changed focus of field needs to be holistic/ interdisciplinary to address the needs of society and community. Research System of ICFRE has been changed from **project based** research to **programme based** research through AICPs/Networking and Inter-institutional Projects. It would lead to optimal utilization of the talent of scientific manpower of the council. The priority of research would be to address livelihood issues of the society and community specifically rural tribal poor and marginal section of the society, apart from looking after contemporary issues of forest management and other stake holders. Thrust Area of research i.e. Managing Forest and Forest Products for Livelihood Support and Economic Growth; Biodiversity Conservation and Ecological Security; Forests and Climate Change; and Forest Genetic Resource Management and Tree Improvement were finalized. Two thrust areas, one for education and one for extension were also formulated.

In a major shift in its policy the council has moved forward to give new direction to its research agenda. ICFRE has identified six Thrust areas which includes four thrust areas of research and one each of extension and education. In order to achieve the future goals, the focus is on improving the productivity of natural forest and plantation through tree improvement and genetic engineering. Special programme based research is proposed to be carried out to meet the challenge of Climate Change and Conservation of biological diversity. Now, hence forth the emphasis is to conduct people centric research leading to livelihood and economic upliftment of farmers and forest dependent communities living in forest fringe villages, specially tribal and rural poor.

Research policy committee has set up clear cut goals for the eight Institutes and four centre's of the council and its scientists by adopting programme mode research with credible delivery system. It was emphasized that research programs must have forward and backward linkages to maintain the continuity of research in a manner that the output of one scientist becomes input of other scientist. Future research would be taken up in the program mode by interdisciplinary team work and should focus on the needs of the society though few research projects of region specific and scientific pursuits may be continued. As the resources are limited with ICFRE, piece meal unproductive research would be stopped and research priorities for the future would be chalked out keeping in mind these constraints and take up only relevant projects. RPC has made a recommendation to group these projects and form All India Coordinated Projects (AICPs), Networked Projects and Inter-institutional Projects to have a more meaningful delivery system.

Under the thrust area on "Managing Forest and Forest Products for Livelihood Support and Economic Growth" importance was given to agroforestry, bamboo processing, non-timber forest resource development and its processing for value addition, forest pest and disease management, and wood science and technology. "Biodiversity Conservation and Ecological Security" thrust area research programs were dominated by themes on restoration and reclamation of degraded sites, protection and conservation of rare and endangered species, development of nursery techniques for important forestry species, control and utilization of invasive species, seed technology, silviculture of important species, and biodiversity and bio-prospecting. Climate change is of concern for one and all. A major emphasis has been given to the thrust area of "Forests and Climate Change" in research policy direction. A comprehensive long term ten year program on climate change studies has been developed for research. The council will be focusing on Impact of climate change on insect diversity their

abundance and migration, impact of elevated Co_2 and temperature on chemical constituents of medicinal and aromatic plants, seed regeneration, forest fire, interaction between vegetation and environment, species genetic diversity and richness of selected forestry species in addition to pattern of litter fall and litter composition. Such studies would help in taking informed decision on practical adaptation action and mitigation measures.

Importance of tree crop productivity and its quality improvement has been felt for meeting the demand of industry and common man. The emphasis under the thrust area "Forest Genetic Resource Management and Tree Improvement" will be on 'Tree improvement and breeding for improved productivity and adaptability', Forest Genetic Resource Evaluation and Conservation, and Applied Genomic Research and genetic engineering for desirable traits for important tree species of different regions of the country including both short and long rotation tree crops. In an effort to develop tree crops important steps has been taken. A long term comprehensive program on this thrust area has been drawn in which the entire ICFRE Institutes would integrate.

Research on advance areas like nanotechnology which can enhance the composite wood properties, enhance faster drug delivery and help absorption of nanoparticles by species from mined and degraded sites would also be research upon and under the four research thrust areas.

Extension of the benefits of research for community and industries has been emphatically pointed out in policy directions. Extension strategies like 'Direct to Consumers" for effective dissemination of the research finding to the user group are being launched and network of extension will be strengthened. In education thrust area, integration of Agriculture, Horticulture and Forestry Universities in the ICFRE education system is deliberated for which a special project proposal is being formulated.

For the smooth delivery of the research programs 6 National Project Directors (NPD) has been designated to collate and coordinate across the Institutes of ICFRE. Thirty six National Subject Matter Coordinators (NSMC) have also been designated to prepare a Status Papers and also support the NPDs. The relook of ICFRE research is aimed at more people centric focus through its programs.

Sudhanshu Gupta, IFS
Secretary, ICFRE

Phones: - 0135-2758614(O)
-0135-2752173(R)

FAX No.- 0135-2750298

INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION
(An Autonomous Body of the Ministry of Environment and Forests, Govt. of India)
P.O. New Forest, Dehradun – 248 006 (Uttarakhand)

No.31-25/2011-ICFRE Dated the 4 August 2011

ORDER

The Director General, ICFRE is pleased to constitute the "Think Tank" consisting following members to get innovative ideas for setting research priorities of ICFRE Institutes during the year 2011-12. The meeting of the Think Tank will be held before RAG 2011 and would advise on setting research priorities.

Sl .No	Name and Designation
1.	Shri S.B. Roy, IBRAD, roysb@vsnl.net
2.	Shri J.S. Samra, CO, NRA jssamra2001@yahoo.com
3.	Shri Vineet Sarin, JICA sarinvineet.id@jica.go.jp
4.	Dr. Ram Prasad, Retd. PCCF, M.P.
5.	Shri Alok Saxena, IFS (AGMUT:83)
6.	Shri N.S. Bisht, IFS (AGMUT:85)
7.	Shri H.S. Sohal, IFS (AGMUT:87)
8.	Shri Manoranjan Bhanja, IFS (AP:84)
9.	Shri Anoop Bhalla, IFS (CH:80)
10.	Shri H.S. Singh, IFS (GU:79)
11.	Dr. P.P. Bhoj Vaid, IFS (HR:83)
12.	Dr. Neeta Hooda, IFS (HR:85)
13.	Dr. Mohit Gera, IFS (JK:87)
14.	Shri M.H. Swaminath, IFS (KT:79)
15.	Dr. B.S. Corrie, IFS (KL:80)
16.	Shri A.K. Jha, IFS (MH:80)
17.	Shri Anil Oberai, IFS (MP:78)
18.	Shri B.M.S. Rathore, IFS (MP:82)
19.	Shri Sidhant Das, IFS (OR:82)
20.	Shri D.N. Pandey, IFS (RAJ:1988)
21.	Shri Arvind Kumar, IFS (SK:85)
22.	Shri P.C. Tyagi, IFS (TN: 83)
23.	Shri R.K. Upadhyay, IFS (TN:84)
24.	Shri N.C. Bahuguna, IFS (WB:79)
25.	All Members of 'Knowledge Pool' and 'Ginger Group'

The first meeting of 'Think Tank' will be held on **23rd September 2011 at 11.00 A.M.** in the Board Room of Forest Research Institute, Dehradun. All members are requested to kindly make it convenient to attend the meeting of the 'Think Tank' on the above date, time and venue.

(Sudhanshu Gupta)
Secretary, ICFRE

No. 14-1/2011/ADG(EIA)/Ginger Group/ICFRE
Environmental Impact Assessment Division
Indian Council of Forestry Research& Education
(An Autonomous Body of Ministry of Environment & Forests, Govt. of India)
P.O. New Forest, Dehra Dun - 248 006

Dated: 8.07.2011

OFFICE MEMORANDUM

Director General, ICFRE has created 'Ginger Group of Scientist' to think beyond the traditional concept of stake holder/demand driven/need driven research concepts. The objectives of the Ginger Group are as under:

1. To bring 'innovative ideas and out of box thinking' for solving the problems of Consumers on the issues relating to emerging challenges of forestry science.
2. To prepare technical reports, bulletins, books and brochures and documents relating to Forestry Science/Research/Education/Extension.
3. To prepare communication strategies for ICFRE.
4. Any other subject matter of scientific/technical importance relating to forestry science.

The 'Ginger Group' will function under the overall guidance of the Director General, ICFRE and will support Director General on scientific/technical research aspects of ICFRE

To achieve the aforementioned objectives and to put in place the same into operation the following team for the 'Ginger Group' is constituted as under:

Institute	Name of the Members	Institute	Name of the Members
ICFRE	Shri V. R. S. Rawat, Sc- E	IFGTB	Shri B. Gurudev Singh, Sc-F
	Shri. S. S. Jain, Sc- E		Dr. V. Mohan, Sc- E
	Dr. V. Jeeva, Sc- E		Dr. B. Nagrajan, Sc- E
	Shri Raman Nautiyal, Sc- E		Dr. Modumita Dasgupta,Sc -D
FRI	Dr. Vimal Kothiyal, Sc – F		Dr. C. Buvaneswaran, Sc - D
	Dr. Sadhna Tripathi, Sc- F	IWST	Dr. Syam Viswanath,Sc- E
	Dr. Sanjay Naithani, Sc- F		Dr. Pankaj K.Aggarwal, Sc-E
	Dr. Y. C. Tripathi, Sc- E		Dr. Ajay G. Karmarkar,Sc - E
	Dr. V. K. Varshney, Sc- E	AFRI	Dr. U. K. Tomar, Sc- E
	Dr. Mohd. Yusuf, Sc- F		Dr. P. H. Chawhaan, Sc- E
	Dr. H. S. Ginwal, Sc- E		Dr. Sangeeta Tripathi, RO
	Dr. A. K. Sharma, Sc- E	HFRI	Dr. K. S. Kapoor, Sc - F
	Dr. Dinesh Kumar, Sc- E		Dr. Vijender Panwar, Sc-C
	Dr. H. B. Vasistha, Sc - E		Dr. Vineet Jishtu, Sc - B
	Dr. Ajay Thakur, Sc - D	RFRI	Shri R. K. Kalita, Sc- D
	Dr. Anup Chandra, Sc- D		Shri P. K. Kaushik, Sc- D
	Dr. P. K. Pandey, Sc- D	TFRI	Dr. S. A. Ansari, Sc- F
	Dr. Ashok Kumar, Sc- D	IFP	Dr. Sanjay Singh, Sc- D
	Mrs. Manisha Thapliyal, Sc-D		

Further, the following Scientist of the ICFRE will support the convener of the 'Ginger Group' in executing the assigned task:

1. Dr. B. M. Dimri – Scientist – B
2. Dr. Anil Negi - Scientist – B

This issues with the approval of Director General, ICFRE.

(SUDHIR KUMAR)
Scientist 'F'
Convener and Technical Advisor
(Ginger Group)

INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION

(An Autonomous Body of the Ministry of Environment and Forests, Govt. of India)

P.O: New Forest, Dehradun – 248 006 (Uttarakhand)

No. 10-20/2011-ICFRE/PIC / 504 **Dated, the 30th May, 2012**

ORDER

Sub: Reconstitution of Networking for Knowledge Pool.

In supersession of Order No. 10-20/2011-ICFRE/PIC /1124, dated 28th September, 2011, the 'Knowledge Pool' is hereby reconstituted as given below:

1.	Dr. P.P. Bhojvaid, Director, FRI	Member
2.	Dr. S.P. Singh, DDG (Admin.), ICFRE	Member
3.	Mr. Saibal Dasgupta, DDG (Extension), ICFRE	Member
4.	Dr. N. Krishna Kumar, Director, IFGTB	Member
5.	Mr. Sandeep Tripathi, DDG (Research), ICFRE	Member
6.	Dr. V.R.R. Singh, Director, HFRI	Member
7.	Mr. Pramod Pant, ADG (Admin.), ICFRE	Member
8.	Dr. Sudhanshu Gupta, Secretary, ICFRE	Member
9.	Dr. A.S. Rawat, Head, Silviculture, FRI	Member
10.	Ms. Neelu Gera, ADG (P&HD), ICFRE	Member
11.	Mr. M.P. Singh, Head, Climate Change & Forest Influence Division, FRI	Member
12.	Mr. R.K. Dogra, ADG (Education & Policy Research), ICFRE	Member
13.	Mr. Pankaj Agrawal, ADG (EM), ICFRE	Member
14.	Dr. T.P. Singh, ADG, Forests & Climate Change, ICFRE	Member
15.	Dr. Renu Singh, Director, Biodiversity, ICFRE	Member
16.	Dr. N.S. Bisht, Director (International Cooperation), ICFRE	Technical Advisor and Convenor

The stated objectives of the "**Knowledge Pool**" are as under:-

- To bring 'innovative ideas and out of box solutions' for solving the contemporary problems of forest management in the country.
- To re-orient the forestry scientist/research workers towards solving the problem of rural poor and tribal and other marginal sections of the society.
- To improve the communication between scientists, research workers and consumer/ stakeholders of research.
- To increase the awareness about the wok done by ICFRE and prepare strategies for technology transfer and develop an interactive paradigm with users of ICFRE works.
- Prepare concept notes on technical/scientific matter of immediate national interests.

Neelu Gera
30/5/2012
(Neelu Gera)
Assistant Director General (P&HD)
ICFRE

INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION

(An Autonomous Body of the Ministry of Environment and Forests, Govt. of India)

P.O: New Forest, Dehradun – 248 006 (Uttarakhand)

No. 7-9/2012-ADG (PF)/NSMC / **Dated the 2nd March, 2012**

ORDER

In partial modification and in continuation of this Office Order No. 7-9/2012-ADG (PF)/NSMC , dated 13.02.2012 the Director General, ICFRE is pleased to designate following **"National Subject Matter Coordinators (NSMC)** to identify research gaps and needs as well as bring into focus the activities of ICFRE.

Sl. No.	Themes	Coordinator
1	Non-timber Forest Products	Shri Loko Puni, Head, NWFP Division, FRI
2	Policy and Legal Issues	Shri R.K. Dogra, ADG (Education), ICFRE
3	Forest Biometrics	Dr. V.P. Tiwari, Head, Wood Energy Division, IWST, Banglore
4	Agro-forestry and Farm forestry	Shri R.P. Singh, ADG (M&P), ICFRE
5	Tribal and Traditional Knowledge	Shri S.D. Sharma, ADG (Stat.), ICFRE
6	Forest Invasive Species (FIS)	Dr. Subhash Nautiyal, Head, Botany Division, FRI
7.	Bamboo and Rattans	Dr. T.C. Bhuyan, RO, RFRI, Jorhat
8.	Systematic Botany	Dr. Veena Chandra, Scientist-F, Bot Division, FRI
9.	Forest Protection	Dr. Mhd. Yusuf, Head, Enntomology Division FRI
10.	Mycorrhiza and Useful Microbes	Dr. N.S.K Harsh, Head, Pathology Division, FRI
11.	Forest Fire and Grazing	Shri Pramod Pant, ADG (Admin.), ICFRE
12.	Forest Biotechnology	Dr. Santan Barthwal, Scientist-D, G&TP Div., FRI
13.	Bio-prospecting and Bio-safety	Dr. S. Murugesan, Scientist – F Bio-prospecting Division, IFGTB, Coimbatore
14.	Intellectual Property Rights	Dr. R.K. Aima, Dean, FRI University, FRI
15.	Forest Products, Value addition and Utilization	Dr. Vimal Kothiyal, ADG (RP), ICFRE
16.	Mine Area Rehabilitation	Dr. H.B. Vasistha, Scientist-E, Ecology Division, FRI
17.	Chemistry and Forest Produce	Dr. Y.C. Tripathi, Head, CFP Div., FRI
18.	Forest Biodiversity	Dr. Renu Singh, Head, BCC, ICFRE
19.	Climate Change and Forest Influences	Shri M.P. Singh, Head, Climate Change Division, FRI

20.	Management of Fringe Forests with other Land uses	Dr. S.D. Sharma, Scientist-E, FRI
21.	Mangroves	Dr. N. Rama Rao, Scientist – E, IWST, Bangalore
22.	Marine and Costal Zone Ecology	Dr. M. Balaji, Scientist – D, IWST, Bangalore
23.	Silviculture and Sustainable Forest Management	Shri A.S. Rawat, Head, Silviculture, FRI
24	Seed Technology	Dr. Manisha Thapliyal, Scientist – D, FRI
25.	Tree Improvement	Dr. Shyam Vishwanath, Head, Tree Improvement, IWST, Bangalore
26	Forest Hydrology	Dr. S.P.S. Rawat, ADG (M&E), ICFRE
27.	Cold Desert	Dr. Vaneet Jishtu, Scientist – B, Cold Desert, HFRI, Shimla
28.	Combating Desertification	Shri Genda Singh, Scientist – F and Head, Forest Ecology, AFRI, Jodhpur
29.	Forest Database	Shri Raman Nautiyal, Scientist - E ICFRE
30.	Environment Economics and Ecosystem Services	Shri H.P. Singh, Scientist – C, FRI, Dehradun
31.	Forestry Extension	Shri R.P. Singh, ADG (M&P), ICFRE
32.	Forestry Education	Shri R.K. Dogra, ADG (Education)ICFRE
33.	Environment Management	Shri Pankaj Agrawal, ADG (EIA) ICFRE
34	Shifting Cultivation	Shri P.K. Kaushik, Head, Shifting Cultivation Division
35.	Forest Genetic Resources	Dr. K. Palanisamy, Scientist – F IFGTB Coimbatore

1. Each Subject Matter Coordinators shall collect and collate the information on the subject from various sources including library and prepare a Status Report on the subject and will prepare a comprehensive document as State of the Knowledge Report on the subject assigned by **July, 2012**.

2. The Report should be of about 80 – 250 pages (**Font size 12, Times New Roman, MSWord by default paragraph spacing**) and review the published and unpublished research on the subject.

3. The status paper shall follow the following format / template:
   (i) Introduction
   (ii) Survey / Review of Literature
   (iii) State of Knowledge – Major findings and Management Status
   (iv) Technologies available for dissemination
   (v) Identification of Research and Development Gaps and
   (vi) Road Map for future Research

4. The NSMCs may form e-groups with Nodal Officers and other scientists / officers working in the field for discussions and sharing of information. E-mails should be preferred medium of communication. Specific requests be made to Head, IT Cell by the NSMCs giving details of the members of the group to form mailing groups.

5. The draft reports are to be submitted to Shri Saibal Das Gupta, DDG (Extension), who would oversee the process of preparation of **"State of the Knowledge Report"** by NSMC.

The Directors of the Institutes shall also identify **Subject Matter Nodal Officers**, for each Institute who will liaise with the **National Subject Matter Coordinators**. Nominations of Nodal Officers may please be sent by **5th March, 2012**.

02/02/2012

(Sandeep Tripathi)
Director (P&IC)
ICFRE

INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION
(An Autonomous Body of the Ministry of Environment and Forests, Govt. of India)
P.O: New Forest, Dehradun – 248 006 (Uttarakhand)

No. 1-6/2011-ADG (PF)/NPD/ Dated the 20th January, 2012

ORDER

In continuation and partial modification to Order No.32-20/2009-ICFRE, dated 12th December, 2011, the Director General, ICFRE is pleased to designate following National Project Directors (NPDs) in the Thrust Areas:

SLNo.	Thrust Area / Field	Name of National Project Director (NPD)
I	Managing Forest and Forests Products for Livelihood Support and Economic Growth	Ms. Neelu Gera IFS, ADG (Project Formulation), ICFRE
II	Biodiversity Conservation and Ecological Security	Dr. Veena Chandra, Scientist - F, FRI, Dehradun
III	Forest Genetics Resource Management and Tree Improvement	Shri M.P. Singh IFS, Head, Climate Change, FRI, Dehradun
IV	Management and Improvement of Forest Genetics Resources for Better Productivity of Goods and Services from Forests	Dr. H.S. Ginwal, Scientist - F, Genetics and Tree Propagation Division, FRI, Dehradun
V	Forestry Education and Policy Research to Meet Emerging Challenges	Shri R.K. Dogra IFS, ADG (Education), ICFRE
VI	Forestry Extension for Taking Research to People	Shri R.P. Singh IFS, ADG (Extension), ICFRE

(i) The NPDs would act as National Focal Point for coordination of activities.

(ii) NPDs would act as independent scientific entities, and would take up the assigned research mandate in due consultations with the Directors of Institutes.

(iii) The NPDs in respective thrust areas would be under the technical control of the following Directors:

Thrust area I	-	DFRI
Thrust area II	-	DIFGTB
Thrust area III	-	DFRI
Thrust area IV	-	DIFGTB
Thrust area V	-	DDG (Edu)
Thrust area VI	-	DDG (Ext)

(iv) They would undertake frequent telephonic consultation / video conferencing with the Institutes and also coordinate with the NSMCs.

Copy to PS to DG

20/1/2012

(Sandeep Tripathi)
Director (P&HC)

No. 1-81/2011-R/ICFRE/BCC /27
Office of the Director General
Task Force on Assessment of Forest Type of India
Indian Council of Forestry Research and Education
P.O. New Forest, Dehradun 248006

Dated 11/01/2012

Office Memorandum

The Forest types of India were classified in the Year 1936 By Sir H.G. Champion which was later on revised in the year 1968 by Sir H.G. Champion and S.K. Seth as 'A Revised Survey of Forest Types of India'. The Champion and Seth's (1968) Classification is still in vogue while many forest types have been changed in their composition and extent due to various anthropogenic and natural factors. Considering these facts, ICFRE has decided to undertake a study on this subject and has constituted a 'Task Force' for reassignment of 'Forest Type of India' vide letter No. 1-81/2011-R/ICFRE/BCC/442 dated 01-12-201.

2. The prime objectives of revising Forest type of India is (i) to understand the impact of climate change on forest vegetation (ii) to devise a forest classification from management perspective, (iii) to develop a forest classification system in line of international organizations like FAO for better understanding of Indian forest perspectives in the international forums and (iv) To prepare a change matrix of forest types of India. ICFRE plans to finish the field work by June 2012 and after analysis of results it intent to publish the findings in next Indian Forestry Congress scheduled in November 2012.

3. In view of above, the aforesaid Task Force has been revised and following officers are nominated in the Task Force as Team Leader, Sub Team leader, Experts and Nodal Officers to accomplish the work of reassignment of Forest type of India.

Sl. No.	Name	Affiliation	Assignment
1	Dr. V.K. Bahuguna	Director General, ICFRE	Team Leader
2	Dr. M.H. Swaminath	Addnl. PCCF, Karnataka	Co-Team Leader
3	Representative DG, FSI	FSI DEhradun	Expert member
4	Dr. G.S. Goraya	CCF, Himachal Pradesh	Expert member
5	Dr. Manoranjan Bhanja	Addnl. PCCF, Andhra Pradesh	Expert member
6	All Directors of ICFRE Institutes		Sub Team Leaders
7	Dr. S. Nautiyal	Head Botany Division, FRI Dehradun	Expert Member
8	Dr. V.R.R. Singh	Head Sivicufture Division FRI Dehradun	Nodal Officer
9	Dr. G. Singh	Head, Forest Ecology Division AFRI, Jodhpur	Nodal Officer
10	Dr. Rama Rao	Scientist 'F' RFRC, Hyderabad	Nodal Officer
11	Dr. Ranjeet Kumar	Head, Ecology Division RFRI, Jorhat	Nodal Officer
12	Dr. Sanjay Singh	Scientist 'D' IIFP Ranchi	Nodal Officer
13	Dr. P.K. Khatri	Scientist 'D' TFRI Jabalpur	Nodal Officer
14	Dr. R.K. Verma	Scientist 'E' HFRI Shimla	Nodal Officer
15	Sh. Sandeep Tripathi	DDG (Res), ICFRE	Member Secretary

4. The Terms of reference of the study (TOR) are:

(i) To revisit the forest types of India and assess the changes, if any due to climatic and other changes

(ii) To integrate the forest type of India with international type of classification

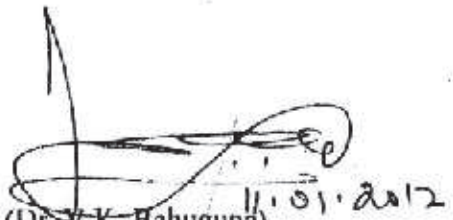
(iii) To ascertain the changes in baseline vegetation and biodiversity of the forest types in order to assess the impact of forest types of India

(iv) To prepare a change matrix of forest types of India.

5. The Task Force shall develop a methodology uniform templete and research protocol for the study and shall complete the study in a given time frame by November 2012.

6. In order to have a better liaison with state forest departments in the field work, state coordinators have been nominated in consultation with State forest departments and Directors of ICFRE Institutes. The list of nominated state coordinators is attached at Annex I.

7. All Directors of ICFRE Institutes, designated as sub Team Leaders shall coordinate the study work in their jurisdiction area.



11.01.2012

(Dr. V.K. Bahuguna)
Director General

1st INDIAN FOREST CONGRESS ADOPTION OF CHARTER

The delegates of 1st Indian Forest Congress unanimously adopted the following **'Indian Forest Congress Charter 2011'**:

1. In order to achieve the "Millennium Development Goals", inter-alia for reducing poverty, it is necessary that enhanced and need-based investment is made in the forestry sector. The contribution of the forestry sector to India's GDP is under-rated (only 1.7%) which represents the sector inadequately and needs to be properly assessed and authenticated. Valuation of forest ecosystem services, eco-tourism, water and soil-conservation, grazing and fuel-wood as well as income generation through forest based product's processing and of forest-based industry should also be included as contribution of forestry sector to GDP. A system of natural resource accounting which accounts for enhanced forest and related resource capital needs to be set in place and accordingly need-based investment in forestry sector should be made as proposed by Forestry Working Group, set up by the Planning Commission for drafting the XII plan for forestry sector, commensurate with contribution of this sector.

2. Wider stakeholder consultation is necessary for evolving policy options in forest conservation and sustainable management. The Government of India established the "Central Board of Forestry" in 1950 with the Minister as chairperson and state forest ministers and independent experts as members. However, the board did not function after 1988 following the approval of Forest Policy 1988 and adoption of JFM approach. The Central Board of Forestry should be revived as an apex body to be headed by the Prime Minister to ensure involvement of all stakeholders regarding national forest policy and strategic issues.

3 There is a need to give a push to futuristic research in frontline themes like tree genetics and breeding, genomics, proteomics, genome mapping, nanotechnology, genetic engineering, bamboo, fibre, food, medicines and nutraceuticals from fungi, biofuels, and application of geomatics in forest survey and inventory so that future demand and expectations of the society from the forests are met sustainably. There is an urgent need to improve the forestry database and forest information system at the State/UT and district/division level of the country to make the forestry planning more effective. Application of the modern scientific tools, such as computer, remote sensing, GIS and GPS in data collection, storage, processing and analysis of the forest resource has to be accelerated in all the States/UTs. This will also help in making the working plans, management plan and micro-plans more accurate and fast.

4. The new futuristic management regime for the forests demands that proper study and assessment of ecosystem goods and services, including biodiversity, climate change, hydrology and NTFPs, provided by the forests should be undertaken to correctly assess the contribution of forests to the economy and social needs.

5. Forest vegetation and hydrology change monitoring is essential to know the impact of climate change on mitigation and adaptation. ICFRE and other research organizations should network and develop a focussed research programme on this subject. A task force for revisiting the forest types of the country should be set up by ICFRE to prepare baseline data on the changes and to bring them on par with international standards and meet the requirements of REDD+.

6. Forest extension activities need to be accelerated on priority. Only a few Van Vigyan Kendras (VVKs) and demonstration villages are presently functioning and helping in technology dissemination to stakeholders. In order to ensure that non-forest lands are brought under tree cover to meet the national target of bringing 33% land mass under forest/tree cover, more VVKs and Demonstration Villages should be established to give the desired impetus to agroforestry/farm forestry and also to 'Green India Mission'.

7. Special focussed efforts at the central and state levels are necessary for convergence between forestry activities and non-forestry land use/schemes for the regeneration of degraded fringe forests and upliftment of poor people particularly the tribals and others in the fringe villages.

8. The Joint Forest Management programme has clearly established its potential with proven facts that it is not only a sustainable forest management model but also an agent of overall socio-economic development of poor forest dependent communities. Forestry should be considered as part and parcel of development of the country. However, community based management systems need to be put in place with innovative scientific inputs for better productivity and ecological sustainability. Now, the time is ripe for second generation reforms in JFM. An expert group should be constituted for this purpose for developing the roadmap for reforms. JFM committees need to be adequately empowered to manage the forest

resources, their capacity built up and legal backing given to them for their success. For the institutional strengthening of the JFMCs, local youth should be engaged to act as facilitators for better communication between forest departments, JFMCs and panchayats. A National Institute for Research and Training on JFM and Forest Based Livelihoods may be set up for capacity building and technical support to the JFMCs. A federation of JFM committees should be created under the Union Minister of Environment and Forests for better coordination and policy inputs. The JFMCs should be legally empowered and maintained as a separate entity. Independent auditing of JFMCs should be introduced.

9. India, in spite of its large human and livestock population, is still able to support good floral and faunal biodiversity. However, human and wildlife conflicts are on the rise and timely steps are needed to minimize the conflicts. Eco-development activities in and around protected areas should be taken up in the "XII Five Year Plan" on priority with sufficient allocation of funds to ensure sustainable wildlife management. The Wild Life Institute of India should bring out biennial assessment report on the status of the national parks and sanctuaries on the lines of the 'State of Forest Report' by FSI.

10. Each state of the country should have a well equipped research organisation to support forestry activities. Scientific human resource at ICFRE needs to be strengthened to cater to the new emerging areas of research. Existing human resource at the state level needs structural reform as the existing staff is unable to meet the future requirement of forest management.

11. The requirement of frontline staff is to be reassessed at beat levels upwards in the state to be manned by technology-savvy frontline staff with modern gadgets and headed by appropriate level of well trained professionals for better delivery. A special provision in the "XII Five Year Plan" is needed for restructuring the frontline organisation of forest departments across the country to meet the emerging expectations of the society. Similarly the training programmes of IFS and SFS officers and frontline staff need to be reoriented to meet the emerging requirements.

12. ICFRE, a premier organisation in forestry should play a lead role in networking with South Asian and other international research institutions for knowledge sharing, scientific exchange programmes and joint research plans. Similarly, the Forest Survey of India should be adequately strengthened to provide the latest technology support to the forestry sector.

13. It is noted that mining often causes serious disturbance to the environment and mineral maps and forest maps of the country overlap. Mining in forest areas should be done on scientific lines well supported with bioremediation. Presently, there is no foolproof system of scientific rehabilitation plan nor expert organisations are involved. This is leading to serious environmental degradation. The mining and restoration of mined out areas should go side by side. The feasibility of underground mining in forest areas should be studied through three-dimensional subsidence analysis especially for coal bearing forested regions so that better technology and forest restoration is employed in the mineral resource exploitation process. All proposals for transfer of forest land for mining should be submitted to MoEF with GIS based maps verified by the state forest department for consideration and future monitoring.

14. The provisions of "Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006" aims at addressing the long standing insecurity of the tenure in cultivated lands in forest areas and legal right of the forest dwelling scheduled tribes and other traditional forest dwellers over the NTFPs, it is essential to use high resolution remote sensor imaginary and GPS/PDA to prepare GIS based maps for clearly demarcating the land to all the forest eligible dwellers in a fair way and also to ensure that there is no scope for encroachment.

15. There is a need for extensive research in ecotourism viz. its potential, carrying capacity, socio-economic aspects, provision of eco-tax and payment of ecosystem services etc.

16. Forestry issues at the national level need to be inculcated in the developmental process holistically. In this context, it is necessary to professionalize the forestry sector and include forestry issues in policy, strategic planning and decision making for sustainable social and economic development.

17. ICFRE headquarters should be shifted to New Delhi for better coordination with national and international organisations.

PROGRAM ON FORESTS & CLIMATE CHANGE

1. BACKGROUNDD

Climate is an active factor in the physical environment of all living things. Climate change is global phenomenon. Climate change and variability are impacting different ecosystem processes and functioning. Processes through soil-vegetation-atmosphere transfer (SVAT) in forest ecosystems are operating on multiple spatial and temporal scales. Response time of forest ecosystems to disturbances ranges from the short-term up to decades and even centuries, depending on the condition of the system and the type, intensity and duration of the external stimuli. The actual state of forest ecosystems largely depends on processes of the past. To understand the consequences of Climate Change on forest ecosystems, assessment of its impacts on Natural Ecosystem Processes is required. A detailed study of the influence of forests on the hydrological cycle of an area is necessary to understand the role forests play in providing this elixir of life. A data base on biomass growth rates, carbon sequestration potential, soil organic carbon etc is also required to be developed for a realistic assessment of the mitigation potential. Modelling studies are required to project climate change impact on forest ecosystems, and adaptation needs in the forestry sector.

The ecosystem response and causal factors are inter-related to each other: studies and experimentations on them separately are not likely to yield the desired results. Thus an all encompassing study is required to assess how temperature build up directs the changes in physiological and morphological characters of plant species leading them to shift to alternate areas or that the disruption of hydrological cycle of an area is the prime reason for changes in the plant habitat leading to changes in biodiversity, water availability, soil water stress and flow to rivers & recharging of aquifers. Without such an interdisciplinary approach to such core issues, the vulnerability assessment cannot be comprehensive and adaptation strategy linked to the livelihood of forest people will not be conclusive.

SBSTA 34 of UNFCCC Dialogue on Research needs and priorities to support emerging issues under the UNFCC had also underlined strong need to maintain systematic observations on a continuous basis, to improve coverage of observations (e.g Himalayas,Africa); and to collect and analyze historical data.

The forests are dynamics in nature. The classification of forest types of India based on interrelation of factors of climate, soil and past treatment was done by Champion & Seth in 1968. Over four decades of classification of forest types, lot of changes in the forest ecosystems have taken place through ecological succession, biotic influences and management interventions. Further increase of temperature and change of rainfall patterns in the past have also made pronounced effect on forest ecosystems. There is an urgent need to revisit forest vegetations and study the present floristic composition and compare with the historical details available in different forms for attribution to climate change.

2. PROPOSAL

An all encompassing study in program mode is launched under the aegis of ICFRE titled "**Climate Change & Forestry Research Programme (CCFRP-INDIA)**" for undertaking studies to improve our understanding and assessment of the impacts of climate change on forest ecosystem processes and functioning and to make informed decisions on practical adaptation actions and mitigation measures.

3. WHY ICFRE ?

Indian Council of Forestry Research & Education under Ministry of Environment & Forests (MoEF) is the nodal agency for undertaking forestry related research and innovations in forestry sector in India. The Council, with its 8 research Institutes spread across the country, has a formidable line up of highly experienced researchers and a team of dedicated forest professionals. ICFRE and its institutes are also a part of institutional network arrangement for greenhouse gas inventory development for national communication (NATCOM) to the United Nations Framework Convention on Climate Change (UNFCCC).

Apart from dealing in core forestry related research issues, ICFRE and its institutes like FRI Dehradun have taken lead to understand the complexities of climate change. The manifestation of the impacts is a witness to the urgency for development of adaptation and mitigation strategies. ICFRE, (India's observer organisation of UNFCCC) has suggested a comprehensive approach on REDD+ as carbon saved is equivalent to carbon added in order to achieve stabilisation and conservation of forest cover and carbon stocks of the country. The changing global scenario needs immediate attention to come up with appropriate mitigation strategies for forests to continue as net sink. Thus, ICFRE, being the nodal organization for development of scientific thought and processes in the forestry sector in India, is set to launch an interdisciplinary, inter-institutional broad based **Program on Forests and Climate Change, Climate**

Change & Forestry Research Programme (CCFRP-INDIA), encompassing all aspects of forest response to climate change and adaptations, and mitigation potential of forests. The program aims to fulfil the research gaps on forest ecosystem processes and functioning on ecosystem basis and up scaling the information to landscape. The major components of the study have been identified and the detailed methodology worked out. After the methodology is standardised, in about a year from now, thence upon all the Institutes of ICFRE and other partners will join this All India Co-ordinated Program in project mode making the study broad based and pan India.

4. DETAILED JUSTIFICATION

Impacts of Climate Change on forest ecosystem are getting manifested as species range shifts, changing biodiversity, pnenological changes in plant life cycles, forest growth pattern of species, changing boundaries of ecosystem, and other biotic and a-biotic responses/ stresses. Research in these topics is relevant for understanding the forest ecosystem processes and functioning to establish the knowledge base needed for monitoring and predicting the impacts of climate change. Although the timing and magnitude of specific ecological affects that might be caused by future climate changes are poorly understood but, the society places a high value on ecosystems and their component organisms (i.e., the plants and animals living in ecosystems). Hence there is an urgent need to develop an improved scientific understanding of the likely effects of climatic change on terrestrial ecosystems. This will facilitate enhanced knowledge on the effects of management options on functions and processes in forest ecosystems and their environmental services.

Temporal dynamics of forest ecosystems operate on multiple time scales, long observation periods are, therefore, necessary in order to identify the key processes that govern the system's behaviour at a considered time scale. The persistent effects of past events are maintained as legacies that can only be resolved and understood by studies which cover the characteristic time scale where these effects are expressed.

Future atmospheric and associated climatic changes are likely to have marked effects on forest ecology impacting both products and the environmental services derived from forests. Increasing concentrations of CO_2 in the atmosphere have the potential to significantly affect forest growth rates, the amount of carbon stored in forest ecosystems, forest biodiversity and the quantity and quality of water derived from forested catchments. Increasing CO_2 concentration interacts in complicated ways with climate, land use and land management, and major anthropogenic and natural disturbances to determine landscape and national impacts. Improved understanding of how elevated CO_2 affects forest growth land systems and surface-atmosphere interactions, will also improve climate models and potentially the reliability of regional climate predictions. Plants respond to rising CO_2 through increased photosynthesis and reduced transpiration. Photosynthesis removes CO_2 from the atmosphere and respiration by plants and heterotrophs, add it back. Thus, the terrestrial biosphere is not just a passive respondent to rising CO_2 but can play a fundamental role in determining the rate of global change.

For the control and management of sustainability in the development of the forest resources, specific scientific knowledge needs to be considerably deepened and enlarged; the relevance of tree species composition, mixture and canopy structure for the impact of environmental changes, their dependency on site conditions and their modification through management need to be analyzed on a broad scale. Sensitive parameters for assessing the state of the forest ecosystems with respect to their resilience towards environmental threats need to be identified. Retrospective observational studies provide a means for describing short as well as long-term forest dynamics and the complex structure of multi-scale relationships. Results of the studies on long-term forest dynamics and the associated key processes will be of significant value for improving our understanding and hence improving the predictive power of process-based modelling approaches.

Thus the study will be carried out to collect information of floristic composition in the identified locations. All climatic and meteorological parameters will be recorded to assess their effect on the species composition. Depending on the ecosystem and frequency of occurrence, the keystone indigenous species likely to be most susceptible to climate change will be identified. The phenological parameters of such selected tree species like flowering/ blooming time, ripening of fruits, quality of seeds, emergence of new leaves and plant functional traits will be recorded to assess the impact on these parameters and traits due to climate change. Similarly, fungi and some butterflies may be good indicators to conclusively prove changes in climate. This way a list of first indicators will be developed which will be most susceptible to climate change.

5. BROAD COMPONENTS OF THE PROGRAM

The present program has been conceived as an interdisciplinary long term program in consultation with respective experts of divisions of FRI Dehradun with Head, Climate Change & Forest Influence Division, FRI as National Project Co-ordinator and Director, FRI, being the overall coordinator of the programme.

The CCFRP shall broadly consist of following 3 components:-

C1. IMPACT COMPONENT

Suggestive list of activities to be taken up in the form of individual project proposals:

Sr. N.	Programme Sub-Component	Activity
1	*Dynamics, Composition & Morphology of Forests*	To assess the impact of climate on species distribution and local abundances, with an emphasis on linkages to forest dynamics and change in forest types mapping
2	*Biogeochemical Interactions*	To analyze the interaction between vegetations and environment with emphasis on carbon and hydrological cycles, plant functional traits and bio-physico-chemical properties of soil
3	*Phenological Studies*	To study the climatic change impact on phenological parameters such as appearance of leaf primordial, leaf fall, opening of flowers, blooming and fruiting in forest species.
4	*Dendrochronology studies*	To undertake the ring analysis of different trees growing in different meteorological settings
5	*Genetic diversity study and species richness*	To elucidate the response of climate change on genetic diversity and species richness of selected forestry species in natural ecosystem.
6	*Insect Diversity/ abundance/ migration*	To study the distribution and local abundances of insects with an emphasis on linkages to migration and habitat change and compilation of list of first indicators.
7	*Fungal diversity & change*	To study composition and dynamics of fungal species *vis a vis* climate change and identification of first indicators of climate change.
8	*Bio-chemical Indicators*	To study the impact of climate change on major active ingredients of selected medicinal & aromatic plants of North-western Himalayan region of India and monoterpene emissions from these plants.
9	*Forest Hydrology*	To study the influence of forest cover on the hydrological regime of a micro watershed and its climatic variability.
10	*Fire frequency and burn severity*	To correlate forest fire incidences with burnt area severity and climate variability.
11	*Climate change prediction modelling*	Modelling and projections to assess climate change impact on forest ecosystems, and adaptation needs in the forestry sector

C2. ADAPTATION COMPONENT

Suggestive list of activity to be taken up in the form of individual project proposal:

Sr. N.	Programme Sub-Component	Activity
1	*Elevated CO2 studies*	Forest ecosystem studies in changed environment conditions of elevated CO2 and temperature by Free-Air CO2 Enrichment (FACE) and Open Top Chambers (OTC) conditions.
2	*Community and Ecosystem*	Develop improved methods for quantification and sustainability of ecosystem services provided by different forest types and landscape
		Develop methodologies to sustainably manage harvest of minor non timber forest products by local communities.
		To mainstream climate change aspects in forest management and community participation.

C3. REDD+ and MITIGATION COMPONENT

Suggestive list of activities to be taken up in the form of individual project proposals:

Sr. N.	Programme Sub-Component	Activity
1.	***REDD+ and carbon accounting***	Project activities should focus on building capacity in the forestry carbon resource assessment in India with emphasis on its Monitoring and Baselines:
		1. Field Data Collection: Developing capacity building to incorporate inventory based carbon resource assessment in the working plan and linking the working plan data with the national forest inventories being carried out by the Forest Survey of India. 2. Remote Sensing and Carbon Assessment: Developing tools and methods for developing relationships between remote sensing data and carbon stocks, in order to mitigate time and cost requirement of recurring physical monitoring of carbon stocks 3. REDD+ Project Methodology Framework: Developing methodologies for REDD+ baseline and project development in line with data availability and forestry conditions prevalent in India. Pilot Projects: Undertaking pilot projects for experiential learning on REDD+ methodology deployment, preferably across landscapes, which exhibit different characteristics, like deforestation, degradation and forest enhancement.
2	*Carbon sequestration*	To assess & enhance the potential of carbon sequestration and storage in forests with synergies between mitigation and adaptation To study carbon sequestration and storage in biomass, soils and wood products for different forest types of India.
		To undertake process based carbon sequestration studies
3	***Community & Forest Management practices***	To develop long term management strategies that optimize the role of forests in sequestering carbon while maintaining production of goods and services under increasing threats.
		Developing mechanisms for incentives to forest communities for reducing degradation in protected areas of the country.
		Developing mechanism for community management of forests as enshrined in FRA for avoiding degradation and deforestation.
		Promoting enhanced carbon sequestration practices on private lands especially fallow lands.
		Improvement of silviculture techniques for enhanced carbon sequestration in forests to accelerate re-growth rates and avoiding degradation.

6. ROAD MAP

C1. IMPACT COMPONENT

This component of the program will take off with FRI in the project mode in the first year to begin with and subsequently all ICFRE institutes will join in the project mode. Subsequently other institutes and universities may join the program to make it broad based. The strategy for the impact study includes Historical Data as reference, Multi-disciplinary & multi-institutional, Network for effective collaboration, International collaboration for capacity building, Infrastructural Support, Systematic observations on a continuous basis, Improved Coverage of observations, and Attribution analysis for climate change impact.

Since the program is long term extending to 10 years, so it is proposed to be implemented in 3 phases. This will result in specific objectives being achieved within stipulated time frames as shown below:

SN.	Phases	Years	Specific Objectives
1	Phase I	1st- 2nd year	1. To establish a network of partners to collaborate in the present study. 2. To collect historical data through literature review and past researches and work done in proposed study areas 3. Capacity building and International collaboration. 4. To plan for systematic observations on a continuous basis needed for climate change vegetation study & modeling 5. To undertake pilot studies for Western Himalayas 6. To integrate project proposals from collaborative partners
2	Phase 2	3rd- 5th year	To be given in the individual project proposal for each component in the ICFRE format
3	Phase 3	6th -10th year	To be given in the individual project proposal for each component in the ICFRE format.

To jump start the program it is proposed to utilize the remaining three months of the financial year 2011-12 itself with initial allocation of thirty lakh. The detailed time frame, duties and teams will be given in the individual project proposals for each project sub-component in the ICFRE format, to be presented in Research Policy Committee of ICFRE. External funding will be explored to make the study broad based.

A dedicated website will be launched for data sharing for whole of India from the permanent observation sites.

C2. ADAPTATION COMPONENT

Similarly for the 2nd component the lead taken by IFGTB, Coimbatore will be utilized to take up further studies in project mode in other institutes. External funding will be explored to take up FACE and OTC studies in Indian forests.

C3. REDD+ and MITIGATION COMPONENT

Research related to carbon sequestration and storage in different forests has already been initiated in ICFRE institutes which will be up-scaled to national level. To take up other activities under REDD+ and mitigation, external funding under Green India Mission and USAID ForestPlus will be explored.

7. STUDY AREA

Although the whole of the country will be covered in the program but as start phase, the impact study will be initiated in one Indian state viz., Uttarakhand under this program and observational stations will be established in different ecosystems along the altitudinal gradient to study the impacts of climate change on long term basis. Preservation Plots in different forest types is likely to provide valuable historical perspectives to be supplemented by other permanent stations to be established under the programme

8. FINANCIAL OUTLAY

To jump start the program it is proposed to utilize the remaining months of the financial year 2011-12 itself for which an initial allocation of Indian rupees 3 million is being made to initiate collection of the historical data available in the literatures and initial procurement of equipments. An amount of Indian **rupees 30 million is being earmarked for the financial year 2012-13 for this programme from Plan fund of ICFRE.** Further external funding will be explored to support the activities under this programme. The budgetary details are given in the individual project proposals for each sub-component in the ICFRE format to be presented in Research Policy Committee (RPC) of ICFRE. An abstract tentative requirement of fund in each phase is given below..

Phase	Phase Period in years	Duration	Financial year	Amount in millions(rupees)
Jump start Phase	Jump start Phase	03 months	2011 - 2012	3.0
Phase I	1st 2nd year	2 years	2012 - 2014	80.0
Phase 2	3rd 5th year	3 years	2014 - 2017	90.0
Phase 3	6th 10th year	5 years	2017 - 2022	80.0

ANTICIPATED OUTCOME

- Inputs to Green India Mission.
- Management of forests & Working Plans
- Vulnerability assessment and adaptations.
- Contribution to plantations by forest department/ private entrepreneurs.
- Enhancement of socio-economic condition of forest fringe villages.
- Poverty alleviation of forest dwellers.
- Inputs to REDD+
- Inputs to Nairobi Work Programme

10. ADDITIONAL INFORMATION

- ICFRE has already identified Climate Change and Forests as one of the thrust areas of forestry research and Director, Forest Research Institute, Dehradun has been nominated as Programme Co-coordinator of this thrust area. A two days workshop was convened by Climate Change & Forest Influences Division of FRI, Dehradun on "Climate change & forestry research needs in Himalayas" on 24-25 Oct, 2011 to provide a forum to explore the gaps in climate change forestry research. One of the main recommendations of the workshop was that since climate change is an inter-disciplinary science and a long term multi-institutional one, so an All-India Co-ordinated Programme on Forests and Climate Change is of utmost necessity to ensure continuity of the research and that the components of forest fires, regeneration status and potential for carbon stock enhancement should also be included. Therefore, Climate Change & Forest Influence Division, FRI Dehradun has taken a lead in preparation of the program on climate change & forests in the light of the recommendations of the said workshop.

- A committee was constituted by the Director General, Indian Council of Forestry Research and Education (ICFRE)) to identify the areas of research and suggest measures to achieve the mandate on Forest Hydrology as a component under All India Coordinated Research work on Climate Change under the chairmanship of Dr. K.D. Sharma, Technical Expert, National Rainfed Area Authority (NRAA), New Delhi. The suggested actions that could help address key questions about the long-term hydrological effects of forest change and conversions include (i) compilation of status of research on forest hydrology (ii) preparation of a catalogue of historical & modern hydrologic records, and (iii) continuing current small watershed experiments and re-establishing small watershed experiments where research has been discontinued. The research studies identified in the report need to be carried out through a chain of interlinked long-term projects using paired watershed approach in different geo-ecological conditions. The nested approach on sub-watershed basis within selected watersheds is suggested for long term hydrological measurement using an integrated approach of hydrologic instrumentation, field investigation, remote sensing and GIS techniques.

Coordinated Research Program (Basic Framework) Thrust Area : Forest Genetics Resource Management and Tree Improvement

National Project Director: **Dr. H.S. Ginwal, FRI Dehradun**

The research at present in ICFRE is project based as per the interest and convenience of the scientists and the regional institutes. This result in lack of continuity of a research activity and also loss of valuable germplam developed under a particular project. There are no long-term research programs of national importance to deliver a concrete solution. Hence, there is need to initiate coordinated research in mission mode across the country on few most important research areas of national importance. Some issues of the regional importance can be taken up on short-term project basis.

ICFRE has recently designated National Project Directors on four main thrust areas, to carry out research in a coordinated manner across the country. The thrust area of "Forest genetic resource management and tree improvement for better productivity of goods and services from the forests" is one of the most important one having the following components in it.

Forest genetics resource management and tree improvement	Conservation of forest genetics resources
	Tree improvement
	Vegetative propagation
	Biotechnology

In order to develop a long term research program on the above components and species specific tree improvement and tree breeding strategy to be adopted across the country having a i) clear-cut deliverable goals to be achieved at periodic intervals, ii) earmarked responsibility of scientists/institutes in the program, iii) assured long term budgetary support iv) coordination between the ICFRE institutes iv) sharing of IPR, initiatives were taken to develop a broad framework wherein the species specific research activities can be fit in across the country.

An exercise was carried out to seek the opinion, comments and suggestions of the scientists working in the related field across ICFRE institutes and the Directors. Based on the opinion and suggestions of the scientists and Directors, and series of discussions with responsive scientists, a broad framework with specific objectives has been developed and is summarized in following paragraphs. The broad framework was presented and discussed thoroughly in the RPC meeting of the ICFRE and modifications were made in the framework with the emerged suggestions/recommendations. In general the consensus was to divide the entire research activity under the thrust area in following three programmes:

Programme I - Tree improvement and breeding for improved productivity and adaptability

Tree breeders and forest geneticists in India are facing new demands to cope with changing needs of forest industry and with changing climate. To address these issues dedicated tree breeding programme has to be reoriented towards development and deployment of productive and adaptive populations and varieties across sites for the benefit of the society.

Objectives

- Development of a comprehensive tree breeding strategy with short-term and long-term goals.
- Development of breeding populations/mapping population with regard to wood, pulp & resistance properties.

- Selection, development, testing and deployment of clones/varieties of commercially important tree species for desirable traits.
- Vegetative propagation (micro and macro) of the elite germplasm.
- Explore possibility of marker-assisted selection (MAS) for breeding and improvement of commercially important tree species.

Species identified/suggested by the institutes for FGR improvement and conservation

S. N.	Institute	Agro forestry / industrial / Timber species	Oil / medicinal species
1	FRI Dehradun	Shisham, *Melia composita*, Poplars, Eucalyptus, *Acacia nilotica*, *Bombax ceiba*, *Ailenthes excelsa*, Bamboos, *Cedrus deodara*, Oaks, *Pinus* sp.,	*Taxus baccata*, *Acacia catechu*, *Acorus calamus*, *Asparagus racemosus*, *Diplonema battersea*, *Pongamia pinnata*, *Rhododendron arboreum*, Myrica sp., *Principia utilis*
2	IFGTB Coimbatore	*Eucalyptus*, *Casuarina*, Acacias, Neem, Teak, Tamarind, Bamboos, *Ailanthus*,, *Melia composita*, *Gmelina*	*Anthocephalus cadamba*, *Thespesia populnea*, *Pterocarpus santalinus*, *Pongamia pinnata*, *Calophyllum inophyllum*, *Sapindus emarginatus*, Dalbergia sp.
3	TFRI Jabalpur	Teak, *Gmelina arborea*, *Albizia procera*, *Dalbergia latifolia*	*Pongamia pinnata*, *Terminalia*, *tomentosa*, *Buchnania lanzan*, *Anogisessus latifolia*, *Madhuca latifolia*, *Pterocarpus marsupeium*, *Boswellia serrata*, *Adina cardifolia*, *Treminalia chebula*, *Bridelia retusa*, *Saraca indica*, *Soymiba febrifuga*, *Sterculiaurens*
4	AFRI Jodhpur	Neem, *Tecomella*, Khezri, *Salvadora*, *Capparis*, *Alianthus*, *Commiphora*, Terminalia's, *Pongamia*, *Boswellia*.	*Ephedra foliata*, *Anogeissus pendula*, *A. latifolia*, *A. sericea*, *A. acuminta*, *Zizyphus mauritiana*, *Withania coagulans*
5	IFP Ranchi	*Pongamia pinnata*, *Anthocephalus chinensis*, *Dalbergia sissoo*, *Schleichera oleosa*, *Madhuca longifolia*, *Bombax ceiba*, Poplar	*Buchanania lanzan*, *Semecarpus anacordium*, *Bamboos*, *Moringa oliefera*, *Pterocarpus marsupeium*, *Diospyros*, *melanoxylon*, sp., Anogeissus
6	RFRI Jorhat	*Gmelina arborea*, Bamboos, *Shorea assamica*, *Melia composita*	*Aquilaria malaccensis*, Dipterocarps, *Cinnamomum*
7	HFRI Shimla	*Cedrus deodara*, *Abies pindrow*, *Abies* sp., *Picea smithiana*, *Taxus baccata*, *Populus* sp., *Salix* sp.,	*Carpinus viminalis*, *Pinus gerardiana*, *Abies*, *spectalatis*, *Juglans*, *Salix* sp,. *Quercus* sp.
8	IWST Bangalore	*Santalum album*, *Melia composita* (dubia), *Gmelina arborea*, *Pterocarpus santalinus*, *Tectona grandis*, *Wrightia tinctoria*	*Wrightia tinctoria*, *Embelia ribes*, *Pongamia pinnata*

During the deliberations and discussions during the RPC, All India Coordinated Projects, Inter-Institutional projects and regional projects will be developed and the existing projects will be revised to meet/fit in the basic framework of the program and objectives. A list of the agreed programs/projects is detailed below :

Species	Name of project activities of AICP	Associates
Eucalyptus (Nodal Institute **IFGTB**)	Establishment of second generation seed orchards and selection of clones for high productivity in *Eucalyptus* (**IFGTB**)	**FRI, TFRI, AFRI**
	Genetic diversity assessment for management of *Eucalyptus* seed orchards (**IFGTB**)	
	Incorporating resistance in *Eucalyptus* to *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae) through expression of insect specific dsRNA (**IFGTB**)	
Teak (Nodal Institute **TFRI**)	Gene-ecological variation in teak populations of Kerala and Tamilnadu (**IFGTB**)	**IFGTB & other ICFRE institutes**
	Developing breeding population of teak with broad genetic base for long term genetic improvement (**IFGTB**)	
Bamboo (Nodal institute **RFRI**)	Stability analysis of Candidate Plus Clumps (CPCs) of Bamboos and Identification of CPCs Specific SSR Markers (**RFRI**)	**IFGTB, FRI, TFRI,**
	Infraspecific variations in carbon assimilation and morphological traits of *Dendrocalamus strictus* (Roxb.) Nees clones. (**FRI**) Productivity studies on commonly cultivated bamboo species in different agro climatic zones of Tamil Nadu (**IFGTB**) Genetic variability assessment of *Dendrocalamus longispathus* (Kurz) in Mizoram and Tripura (**RFRI**)	
Melia composita (Nodal institute **FRI**)	Genetic screening of productive and adaptive progenies in *Melia composita* Willd. (**FRI**)	**IFGTB, AFRI, IWST, RFRI**
	Collection, Conservation and Evaluation of *Melia dubia* Germplasm of North-Eastern India. (**RFRI**)	

- All India Coordinated Project for improvement of fast growing *phyllodinous Acacias* (Lead institute IFGTB Coimbatore)
- All India Coordinated Project on fast growing native tree species (Lead institute IFGTB Coimbatore)

Inter-institutional Projects

Species	Name of existing projects to be incorporated	Institute
Acacia nilotica (Nodal institute: **FRI**)	Selection and screening of germplasm of *Acacia nilotica* L. to improve Productivity in Tamil Nadu. (**IFGTB**)	**AFRI, IFGTB, CAZRI**
	Genetic improvement of *Acacia nilotica* through selection and evaluation of germplasm in northern India (**FRI**)	

Species	Name of existing projects to be incorporated	Institute
Dalbergia latifolia (Nodal institute: **IWST)**	Selection and genetic evaluation of *Dalbergia latifolia* germplasm in north India (**FRI**)	**FRI, TFRI, IFGTB**

Regional Projects

Title of the project	Institute
Genetic diversity and adaptability through morphological and molecular markers in *Dalbergia sissoo* Roxb. (**FRI**)	**FRI**
Germplasm assemblage and Improvement of *Leucaena leucocephala* (Lam.) de Wit for industrial biomass productivity (**IFGTB**)	**IFGTB**
Screening of *Gmelina arborea* Roxb. clones for productivity and stability (**RFRI**)	**RFRI**
Assessment of variability, improvement and refinement of cloning techniques of *Tecomella undulata* **(AFRI**)	**AFRI + IWST**

Projects to be submitted to CAMPA

Genetic evaluation of seed orchards, clonal trials and seed production areas and establishment of seed stands / seed orchards in Uttarakhand (**FRI**)	**FRI**

Develop National Tree Breeding strategy/Improvement Program (Multi-institutional)

S. No.	Name of Species	Name of Species Coordinator	Other institutes to be associated
1.	Eucalypts*	Dr. V. Sivakumar, IFGTB	FRI, AFRI, IWST-FRC
2.	Casuarinas*	Dr. A. Nicodemus, IFGTB	-
3.	*Melia composita (dubia)**	Dr. Ashok Kumar, FRI	IFGTB, IWST, FRC,
4.	Poplars	Dr. Dinesh Kumar, FRI	IFP, RFRI
5.	Red Sander	Dr. S. Patnaik , FRC	IWST, IFGTB
6.	*Anthocephalus chinensis*	Dr. Sanjay Singh, IFP	IFP, IFGTB & OTHERS
7.	*Tectona grandis**	Dr. S.A. Ansari, TFRI	IFGTB, AFRI
8.	*Santalum album*	Dr. Syam Vishwanath, IWST	IWST, IFGTB, FRC

*** Breeding strategy will also be the Part of the AICP being developed**

Program 2 Forest Genetic Resource Evaluation and Conservation

Objectives

- To assess the status of FGR using available tools and techniques (molecular and GIS) by taking up (a) population genetic study (genetic diversity, structure, gene flow etc.), (b) phylogenetic and phylogeography study to understand evolutionary potential of species and at the same time addressing problems related to taxonomy and plant systematic.
- To identify and conserve genetically most diverse hotspot as *in situ* conservation area, and to identify genetically diverse populations from where to source genetic material of target species for *ex situ* conservation.
- Development of in-vitro and long-term conservation techniques (tissue culture, cold room, liquid nitrogen).

- Initiate activities of Forest Genetic Resource Management Network (FGRMN) with following objectives:
  - Collection, documentation, characterization of forest genetic resources and their conservation in collaboration with state forest departments, ICFRE institutes and other national organizations/institutions.
  - Establish ex-situ germplasm banks/repositories for conservation of FGR using appropriate tools technologies and dissemination of material and information.

The following projects will be part of this program

S. No.	Sub-projects of the program
1	Exploration and Collection of Forest Genetic Resources and Development of National Gene bank **(IFGTB)**
2	Collection of germplasm of *Madhuca indica* J. F. Gmel. for identification of best sources in Chhattisgarh through phytochemical evaluation. (**TFRI**)
3	Standardization of vegetative propagation techniques for *Shorea robusta* Garetn. **(TFRI)**
4	Genetic Diversity Analysis of Blue pine (*Pinus wallichiana*) through DNA markers **(FRI)**
5	Tree Borne Oil seeds (TBOs) in community lands for Improved Livelihoods of Vulnerable Groups of Jharkhand (**IFP**)
6	Study on chromosomal aberrations and phenotypic abnormalities in trees growing in polluted areas around sponge iron factories for determination of mitigation strategies of pollution effect. (TFRI)
7	Cytogenetic analysis in important native tree species (**IFGTB**)
8	Mapping and monitoring of *Casuarina* and *Eucalyptus* plantations in Tamilnadu using RS and GIS techniques (**IFGTB**)

Program 3 Applied Genomic Research and genetic engineering for desirable traits

Objectives :

- Development of Microsatellite markers for important tree species: Microsatellites are the best DNA markers that are useful in numerous applications like genetic diversity, structure, gene flow, fingerprinting for forensics and IPR issues etc.
- **Develop understanding the association of genes/gene regions including** QTL mapping and association mapping in forest trees with quantitative (growth) and qualitative traits (disease and pest resistance, drought and salt tolerance, wood & pulp characters)**.**
- Understand the molecular mechanism determining a trait in different tree species**.**
- Genetic engineering of trees for biotic & abiotic stress tolerance and commercially important traits (altered lignin/ cellulose profiles).
- Allele mining for traits related to biotic and a biotic stress
- Development of bioinformatics tools and database for the priority species

The following projects will be part of this programme

S. No.	Sub-projects of the programme
1	Incorporating resistance in Eucalyptus to *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae) through expression of insect specific dsRNA (**IFGTB**)
2	Screening tree species for their potential to accumulate metals and to produce nanoparticles under in vivo and in vitro conditions. (**AFRI**).

Deffered Projects of AFRI, Jodhpur of XII RPC 2011-12

Project Title: Refinement of protocol for macro and micro propagation of *Azadirachta indica* A. Juss for large scale mulitiplication, evaluation of genetic fidelity and establishment of field trials

Research Planning Division
(Directorate of Research)
Indian Council of Forestry Research & Education
(An Organisation of Ministry of Environment & Forests, Govt. of India)
P. O. New Forest, Dehra Dun - 248 006

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